

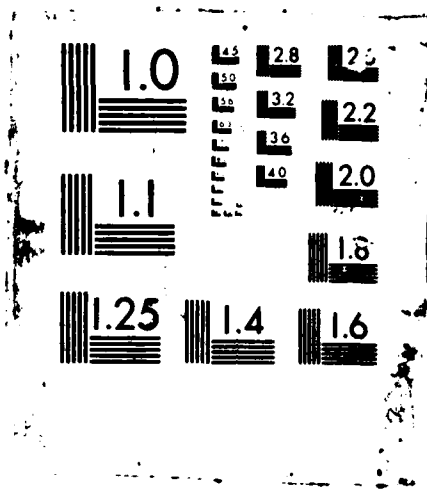
ANALOG TO DIGITAL CONVERSION AND VERIFICATION PROGRAMS
FOR A VAX 11/780(U) NAVAL UNDERWATER SYSTEMS CENTER NEW
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NAVAL UNDERWATER SYSTEMS CENTER
NEW LONDON LABORATORY
NEW LONDON, CONNECTICUT 06320

Technical Memorandum

ANALOG TO DIGITAL CONVERSION AND VERIFICATION PROGRAMS
FOR A VAX 11/780

Date: 21 November 1986

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ABSTRACT

A procedure for digitizing data on a Vax 11/780 computer using VAX FORTRAN programs and VMS system service routines was developed. Brief descriptions and source listings of the programs are enclosed. In addition, several auxiliary programs used for verifying the procedure are also enclosed.

ADMINISTRATIVE INFORMATION

This work was supported under NUSC Project No. B69025, Broadband Bearing-Time Processing, P. D. Herstein, Principal Investigator. Funding was provided under Program Element No. 62711 through Naval Air Development Center, R. Fosko, Program Manager.

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Approved For

A-1

INTRODUCTION

Digitizing analog tapes is a necessary part of many data analysis projects. A FORTRAN program for digitizing data on a Vax 11/780 computer using VMS system service routines is described as well as several additional verification programs.

HARDWARE

For each experiment the hardware setup will vary slightly. Appendix A shows the hardware our experiment used. This included a Vax 11/780 computer with one LPA11-K, 12 bit, 16 channel analog to digital (A/D) converter in dedicated mode. The digital tape drive was a TU78, 9 track, 6250 bpi drive. (Slower speed tape drives were not able to keep up with our particular application.)

The A/D converter was triggered by an external Schmidt trigger. For this particular application, we sampled the data at 2.5 kHz. If the internal clock is desired, the source code would have to be altered.

A final digitized data sample is a 16 bit word (I*2 data type), accurate to 12 bits and ranging from -5 to +5 volts. Real data are scaled by

```
REAL_DATA=FLOAT(I*2_DATA)/409.5 - 5.
```

PROCESSING PROCEDURE

For the application described, 24 channels of analog data were digitized. Since the computer had one 16 channel A/D, it was necessary to process the data in two passes of 14 channels each. The second pass repeated 4 channels; these were used for alignment. Disk/tape constraints forced each run to be digitized in four parts, an end alignment was necessary. The method used for alignment is described in TM NO. 861118, "RECAT - REDUNDANT CHANNEL ALIGNMENT TECHNIQUE", BY W. HAUCK. The procedure for digitizing one tape follows.

- A. Log onto the computer.
- B. Mount the analog tape and check all hardware settings.
- C. Mount the digital tape.
- D. ALLOCATE MFA0: (HIGH SPEED TAPE DRIVE)

- E. Activate A2D.COM
1. Initialize the magnetic tape
 2. Assign the appropriate output data disk
 3. Enter the digitizing setup via "ENTERHEAD" program
 4. Assign and mount the magnetic tape
 5. Alter the user priority to 28 (VERY HIGH!!)
 6. Perform the digitizing task via "A2D" program
 7. Set the priority back to 4 (NORMAL)
 8. Copy the recat files for alignment (both passes and ends) from tape to disk via "SAVRECAT" program
 9. Copy the quick check files to disk via "READDT" program
 10. Dismount the magtape and deallocate the drive
 11. Label the tape
- | | | |
|--------|-------|-------------|
| TAPEID | RUN | PASS |
| 9 TRK | START | ___:___:___ |
| 6250 | STOP | ___:___:___ |
| FOR | _____ | BUFFERS |
12. Run the quick check plot program, "QUPL" to verify the data looks okay.
- F. Repeat B-E as needed
- G. Logoff when done

This procedure is repeated for one run worth of data (4 parts, 2 passes of each). The "RECAT" program will calculate the the alignment values. The data is then downsampled and or filtered and later merged, depending on your desires.

PROGRAM DESCRIPTIONS

A. ENTERHEAD.FOR - The operator enters all identification information when this program is run. That information is stored in a data file for retrieval by the actual digitizing program. This method of entering was selected because the probability of repeating a digitizing session is very high.

Routines called are LISTHEAD.FOR.

B. A2D.FOR - Performs the digitizing task. The identification information entered by ENTERHEAD is written to the first record of each tape. It is followed by records containing the digitized data. The digitized records are 14,000 bytes long consisting of 7000 samples. (500 samples/channel x 14 channels) Within each record the order of the samples is: sample 1, chan 1-14, sample 2, chan 1-14, ... sample 500, chan 1-14. The final record is

followed by two end of file markers to signify end of tape.

The record size chosen was based on the sample rate and the number of channels. Users should establish a reasonable record size for writing to tape.

Routines called are GETHEAD and LISTHEAD.

NOTE: When digitizing, the user must have a real time priority; 28 or 30 seems to be sufficient. Ask the system manager for the ALTPRI privilege.

C. SAVRECAT.FOR - Reads a tape made by A2D and extracts the channels chosen for alignment. The first 500 records and the last 50 records are written to disk. RECAT, as described in TM NO. 861118 uses these files for alignment procedures.

Routines called are LISTHEAD.

D. READDT.FOR - Reads a digitized tape and separates all channels into separate files. Each record contains 500 samples of A/D channels 1-14.

Routines called are LISTHEAD.

E. QUPL.FOR - Plots the first 4 records of digitized tape, 1 channel/plot and 4 channels/page.

Routines called are PLCHAN and plotting routines from the library QPLOT or GRAFX.

F. DOWNSAMP.FOR - Reads a digitized tape, downsamples it, changes the record sizes if desired and saves it on disk. Alignment procedures, appending, throwing away and saving data are completed. The disk file consists of one header identification record followed by records containing 1024 words from A/D chan 1, 1024 words from A/D chan 2, ... 1024 words from A/D chan 14.

Routines called are LISTHEAD.

G. MERGEMT.FOR - Reads the disk files created by "DOWNSAMP" for one run, passes 1 and 2 and merges each record. The final tape contains all 24 analog channels, redundant channels are discarded. The final tape format is:

One header identification record 14000 bytes long
Records (49152 bytes) of 1024 samples from channel 1
1024 samples from channel 2
.
.
.
1024 samples from channel 24

Routines called are LISTHEAD.

H. READMT.FOR - Reads a merged tape and writes the data out to disk, one channel per file. Records consist of 1024 samples each.

Routines called are ASSMT, RBLOCKMT, and LISTHEAD.

REFERENCES

- [1] LPA11-K FORTRAN USER'S REFERENCE GUIDE, prepared by Digital Equipment Corporation, 1979.
- [2] LPA11-K LABORATORY PERIPHERAL ACCELERATOR USER'S GUIDE, prepared by Digital Equipment Corporation, April 1978.
- [3] VAX/VMS I/O USER'S REFERENCE MANUAL: PART I, prepared by Digital Equipment Corporation, July 1985, Version 4.2

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APPENDIX B - LISTING OF A2D.COM
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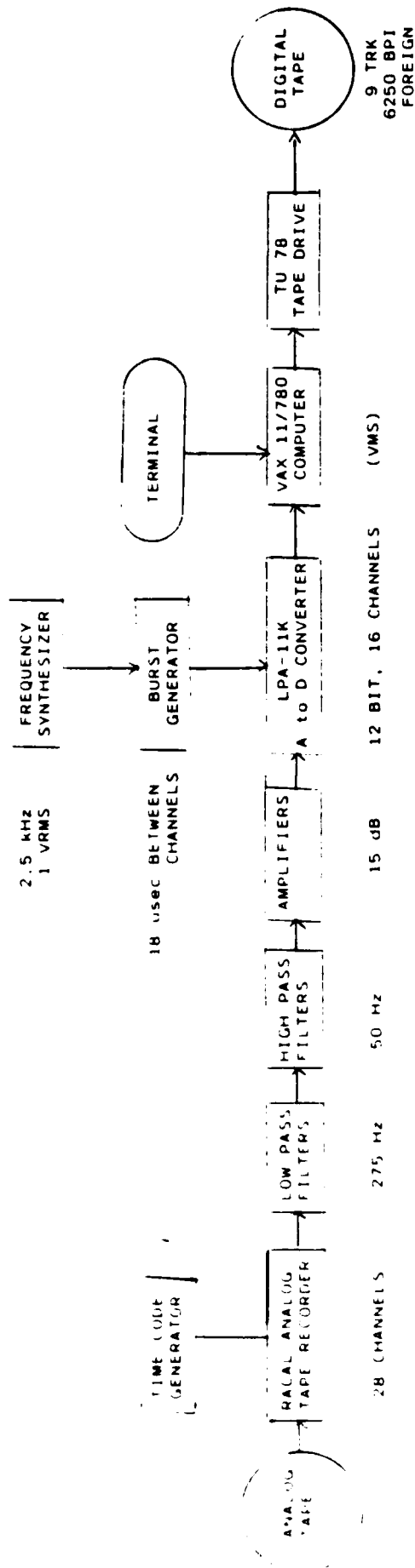
TM No. 861214

APPENDIX A

HARDWARE SETUP

A-1/A-2
Reverse Blank

DIGITIZING HARDWARE SETUP



TM No. 861214

APPENDIX B

LISTING OF A2D.COM

B-1/B-2
Reverse Blank

_DRB0:[MACIE.TM]A2D.COM;30

```

$! A2D.COM  COMMAND STREAM FOR DIGITIZING 14 A/D CHANNELS.
$! -----
$! SET VERIFY
$   IF P1 .EQS. "" THEN -
$   INQUIRE P1 "DO YOU WANT TO INITIALIZE THE TAPE? (Y/N)"
$   IF F$STRING(P1) .EQS. "N" THEN GOTO SETDISK
$!
$   IF P2 .EQS. "" THEN
$   INQUIRE P2 "ENTER TAPE LABEL? (R__P_)"
$   ALLOCATE MFA0:
$   INITIALIZE/DENSITY=6250 MFA0: 'P2'
$!
$ SETDISK:
$   IF P3 .EQS. "" THEN INQUIRE P3 "IS DATA GOING TO DISK 0 OR 1?"
$   IF F$STRING(P3) .EQS. "0" THEN SET DEF DRB0:[A2D.DATA]
$   IF F$STRING(P3) .EQS. "1" THEN SET DEF DRB1:[A2D.DATA]
$!
$ SETUP:
$   IF P4 .EQS. "" THEN -
$   INQUIRE P4 "HAVE YOU ENTERED THE DIGITIZING SETUP? (Y/N)"
$   IF F$STRING(P4) .EQS. "Y" THEN GOTO MTAPE
$   ASSIGN/USER SYSS$COMMAND SYSS$INPUT
$   RUN DRB0:[A2D.DIGIT]ENTERHEAD      !ENTER HEADER INFORMATION
$!
$ MTAPE:
$   IF P5 .EQS. "" THEN -
$   INQUIRE P5 "DID YOU ASSIGN AND MOUNT THE MAGTAPE? (Y/N)"
$   IF F$STRING(P5) .EQS. "Y" THEN GOTO DIGIT
$   ASSIGN MFA0: MAG TAPE
$   MOUNT/FOR/DENS=6250 MFA0:
$!
$ DIGIT:
$   SET PROC/PRIV=PSWAPM                !SET UP PRIVILEGES/PRIORITY
$   SET PROC/PRIV=ALTPRI
$   SET PROC/PRIO=30
$   ASSIGN/USER SYSS$COMMAND SYSS$INPUT
$   RUN DRB0:[A2D.DIGIT]A2D              !PERFORM DIGITIZING
$   SET PROC/PRIO=4                     !SET PRIORITY BACK DOWN
$!
$   IF P6 .EQS. "" THEN -
$   INQUIRE P6 "DO YOU WANT TO COPY THE RECAT FILES TO DISK? (Y/N)"
$   IF F$STRING(P6) .EQS. "N" THEN GOTO QUPL
$   ASSIGN/USER SYSS$COMMAND SYSS$INPUT
$   RUN DRB0:[A2D.DIGIT]SAVRECAT          !COPY THE RECAT FILES
$!
$ QUPL:
$   INQUIRE P7 "DO YOU WANT TO COPY THE QUICK CHECK FILES TO DISK? (Y/N)"
$   IF F$STRING(P7) .EQS. "N" THEN GOTO MTDISM
$   SET DEF DRB1:[A2D.QUPL]
$   ASSIGN/USER SYSS$COMMAND SYSS$INPUT
$   RUN DRB0:[A2D.DIGIT]READT
$   WRITE SYSS$OUTPUT "YOU NEED TO RUN DRB0:QUPL.COM TO MAKE PLOTS"
$!
$ MTDISM:                                !DISMOUNT THE TAPE
$   IF P8 .EQS. "" THEN -
$   INQUIRE P8 "DO YOU WANT TO DISMOUNT THE TAPE? (Y/N)"
$   IF F$STRING(P8) .EQS. "Y" THEN DISMOUNT MFA0:
$!

```

_DRB0:[MACIE.TM]A2D.COM;30

\$ DONE:

\$ WRITE SYS\$OUTPUT "DIGITIZING PROCEDURE COMPLETE"

\$ EXIT

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APPENDIX C

LISTINGS OF
ENTERHEAD.FOR
LISTHEAD.FOR

C-1/C-2
Reverse Blank

_DRB0:[MACIE.TM]ENTERHEAD.FOR;13

C ENTERHEAD.FOR HAS THE OPERATOR ENTER THE HEADER INFORMATION
C AND SAVE IT IN A DATA FILE.

```

C -----
C HEADB(1-2) HEADI2(1) ANALOG TAPE NUMBER
C HEADB(3) HEADI2(2) PASS NUMBER (1,2 OR 3)
C HEADB(4) " NUMBER OF CHANNELS 14 OR 24
C HEADB(5) HEADI2(3) DIGITIZING MONTH
C HEADB(6) " DIGITIZING DAY
C HEADB(7) HEADI2(4) DIGITIZING YEAR
C HEADB(8) " EXPERIMENT TIME CODE START HOUR
C HEADB(9) HEADI2(5) EXPERIMENT TIME CODE START MINUTE
C HEADB(10) " EXPERIMENT TIME CODE START SECONDS
C HEADB(11-30) HEADI2(6-15) EVENT NAME (20 CHAR MAXIMUM)
C HEADB(31) HEADI2(16) ANALOG CHANNEL IN POSITION 1
C HEADB(32) " ANALOG CHANNEL IN POSITION 2
C HEADB(33) HEADI2(17) ANALOG CHANNEL IN POSITION 3
C HEADB(34) " ANALOG CHANNEL IN POSITION 4
C HEADB(35) HEADI2(18) ANALOG CHANNEL IN POSITION 5
C HEADB(36) " ANALOG CHANNEL IN POSITION 6
C HEADB(37) HEADI2(19) ANALOG CHANNEL IN POSITION 7
C HEADB(38) " ANALOG CHANNEL IN POSITION 8
C HEADB(39) HEADI2(20) ANALOG CHANNEL IN POSITION 9
C HEADB(40) " ANALOG CHANNEL IN POSITION 10
C HEADB(41) HEADI2(21) ANALOG CHANNEL IN POSITION 11
C HEADB(42) " ANALOG CHANNEL IN POSITION 12
C HEADB(43) HEADI2(22) ANALOG CHANNEL IN POSITION 13
C HEADB(44) " ANALOG CHANNEL IN POSITION 14
C HEADB(45) HEADI2(23) ANALOG CHANNEL IN POSITION 15
C HEADB(46) " ANALOG CHANNEL IN POSITION 16
C HEADB(47) HEADI2(24) ANALOG CHANNEL IN POSITION 17
C HEADB(48) " ANALOG CHANNEL IN POSITION 18
C HEADB(49) HEADI2(25) ANALOG CHANNEL IN POSITION 19
C HEADB(50) " ANALOG CHANNEL IN POSITION 20
C HEADB(51) HEADI2(26) ANALOG CHANNEL IN POSITION 21
C HEADB(52) " ANALOG CHANNEL IN POSITION 22
C HEADB(53) HEADI2(27) ANALOG CHANNEL IN POSITION 23
C HEADB(54) " ANALOG CHANNEL IN POSITION 24
C HEADB(55) HEADI2(28) RUN IDENTIFICATION NUMBER
C HEADB(56) "
C HEADB(57-60) HEADFP(15) SAMPLE RATE (2.5 KHZ=.0004SEC)
C -----

```

```

C
C PARAMETER NCHN=14 !NUMBER OF A/D CHANNELS
C PARAMETER NBYTES=NCHN*500*2 !NUMBER OF BYTES PER RECORD
C PARAMETER NI2=NBYTES/2 !NUMBER OF 1*2 WORDS
C PARAMETER NI4=NBYTES/4 !NUMBER OF 1*4 WORDS OR FLOATING PT

```

```

C
C CHARACTER*1 ANS
C BYTE HEADB(NBYTES),ITITLE(20),FILNAM(11)
C INTEGER*2 HEADI2(NI2)
C INTEGER*4 HEADI4(NI4)
C REAL HEADFP(NI4)
C EQUIVALENCE (HEADB(11),ITITLE)
C EQUIVALENCE (HEADB,HEADI2,HEADI4,HEADFP)
C DATA HEADI4/NI4*0/
C -----

```

_DRB0:[MACIE.TM]ENTERHEAD.FOR;13

```

C
C-----ASK THE OPERATOR FOR ALL HEADER INFO
C
100      CONTINUE
        PRINT 1
1        FORMAT(X/X,'ENTER ANALOG TAPE NUMBER: ', $)
        READ *, HEAD12(1)
C
        PRINT 13
13       FORMAT(X/X,'ENTER RUN IDENTIFICATION NUMBER: ', $)
        READ *, HEAD12(28)
C
        PRINT 2
2        FORMAT(X/X,'ENTER DATA TAPE PASS NUMBER (1 OR 2)? ', $)
        READ *, HEADB(3)
C
        PRINT 11
C11      FORMAT(X/X,'ENTER NUMBER OF CHANNELS/HYDROPHONES : ', $)
C        READ *, HEADB(4)
        HEADB(4)=14
        NCHAN=HEADB(4)
C
        PRINT 3
3        FORMAT(X/X,'ENTER DIGITIZING DATE:  MONTH ', $)
        READ *, HEADB(5)
        PRINT 4
4        FORMAT(X/X,'                                DAY ', $)
        READ *, HEADB(6)
        PRINT 5
5        FORMAT(X/X,'                                YEAR ', $)
        READ *, HEADB(7)
C
        PRINT 6
6        FORMAT(X/X,'ENTER START TIME CODE:  HOUR ', $)
        READ *, HEADB(8)
        PRINT 7
7        FORMAT(X/X,'                                MINUTES ', $)
        READ *, HEADB(9)
        PRINT 8
8        FORMAT(X/X,'                                SECONDS ', $)
        READ *, HEADB(10)
C
        DO I=11,30
          HEADB(I)=' '
        END DO
        PRINT 9
9        FORMAT(X/X,'ENTER 20 CHARACTER EVENT DESCRIPTION: ', $)
        READ 10, NC, (ITITLE(I), I=1, NC)
10       FORMAT(Q,20A1)
        DO I=1, NC
          HEADB(10+I)=ITITLE(I)
        END DO
C
        DO I=1, NCHAN
          PRINT 12, I
12       FORMAT(X/X,'ENTER ANALOG CHANNEL FOR A/D CHANNEL ', I2, ' : ', $)
          READ *, HEADB(I+30)
        END DO

```


_DRB0:[MACIE.TM]ENTERHEAD.FOR;13

C

HEADFP(15)=1./2500./4. !SAMPLE RATE 2.5 KHZ AT 1/4 SPEED

C

C-----SAVE THE INPUTS IN A DATA FILE

C

ENCODE(10,14,FILNAM) HEADI2(28),HEADB(3)

14 FORMAT('R',I2,'P',I1,'H.DAT')

FILNAM(11)=0

PRINT 16

PRINT 15, (FILNAM(I),I=1,10)

15 FORMAT(X,'DATA WILL BE SAVED IN FILE: ',10A1)

PRINT 16

CALL LISTHEAD(HEADB,HEADI2,HEADI4)

PRINT 16

16 FORMAT(X,80('-'))

PRINT 17

17 FORMAT(X/X,'DOES THIS DATA LOOK CORRECT? (Y/N) ',S)

READ 18, ANS

18 FORMAT(A1)

IF(ANS.EQ.'N') GO TO 100

OPEN(UNIT=10,NAME=FILNAM,STATUS='NEW',FORM='UNFORMATTED')

WRITE(10) HEADB

CLOSE(UNIT=10)

C

CALL EXIT

END

_DRB0:[MACIE.TM]LISTHEAD.FOR;11

```

C      LISTHEAD.FOR      LISTS OUT THE HEADER INFORMATION FOR A
C                          SPECIFIED TAPE.
C-----
C      HEADB(1-2)        HEADI2(1)        ANALOG TAPE NUMBER
C      HEADB(3)          HEADI2(2)        PASS NUMBER (1,2 OR 3)
C      HEADB(4)          "                NUMBER OF CHANNELS 14 OR 24
C      HEADB(5)          HEADI2(3)        DIGITIZING MONTH
C      HEADB(6)          "                DIGITIZING DAY
C      HEADB(7)          HEADI2(4)        DIGITIZING YEAR
C      HEADB(8)          "                EXPERIMENT TIME CODE START HOUR
C      HEADB(9)          HEADI2(5)        EXPERIMENT TIME CODE START MINUTE
C      HEADB(10)         "                EXPERIMENT TIME CODE START SECONDS
C      HEADB(11-30)      HEADI2(6-15)     EVENT NAME (20 CHAR MAXIMUM)
C      HEADB(31)         HEADI2(16)       ANALOG CHANNEL IN POSITION 1
C      HEADB(32)         "                ANALOG CHANNEL IN POSITION 2
C      HEADB(33)         HEADI2(17)       ANALOG CHANNEL IN POSITION 3
C      HEADB(34)         "                ANALOG CHANNEL IN POSITION 4
C      HEADB(35)         HEADI2(18)       ANALOG CHANNEL IN POSITION 5
C      HEADB(36)         "                ANALOG CHANNEL IN POSITION 6
C      HEADB(37)         HEADI2(19)       ANALOG CHANNEL IN POSITION 7
C      HEADB(38)         "                ANALOG CHANNEL IN POSITION 8
C      HEADB(39)         HEADI2(20)       ANALOG CHANNEL IN POSITION 9
C      HEADB(40)         "                ANALOG CHANNEL IN POSITION 10
C      HEADB(41)         HEADI2(21)       ANALOG CHANNEL IN POSITION 11
C      HEADB(42)         "                ANALOG CHANNEL IN POSITION 12
C      HEADB(43)         HEADI2(22)       ANALOG CHANNEL IN POSITION 13
C      HEADB(44)         "                ANALOG CHANNEL IN POSITION 14
C      HEADB(45)         HEADI2(23)       ANALOG CHANNEL IN POSITION 15
C      HEADB(46)         "                ANALOG CHANNEL IN POSITION 16
C      HEADB(47)         HEADI2(24)       ANALOG CHANNEL IN POSITION 17
C      HEADB(48)         "                ANALOG CHANNEL IN POSITION 18
C      HEADB(49)         HEADI2(25)       ANALOG CHANNEL IN POSITION 19
C      HEADB(50)         "                ANALOG CHANNEL IN POSITION 20
C      HEADB(51)         HEADI2(26)       ANALOG CHANNEL IN POSITION 21
C      HEADB(52)         "                ANALOG CHANNEL IN POSITION 22
C      HEADB(53)         HEADI2(27)       ANALOG CHANNEL IN POSITION 23
C      HEADB(54)         "                ANALOG CHANNEL IN POSITION 24
C      HEADB(55)         HEADI2(28)       RUN IDENTIFICATION NUMBER
C      HEADB(56)         "
C      HEADB(57-60)      HEADFP(15)       SAMPLE RATE (2.5 KHZ=.0004SEC)
C-----

```

```

SUBROUTINE LISTHEAD(HEADB,HEADI2,HEADI4)
C-----

```

```

C      BYTE HEADB(1)
C      INTEGER*2 HEADI2(1)
C      INTEGER*4 HEADI4(1)

```

```

C-----PRINT OUT THE ALL HEADER INFO
C

```

```

C      PRINT 1, (HEADB(I),I=11,30)
C      FORMAT(X,' *** EVENT DESCRIPTION: ',20A1,' ***')

```

```

C      PRINT 2, HEADI2(1)
C      FORMAT(X/X,'          ANALOG TAPE NUMBER: ',4X,I4)

```

```

C      PRINT 3, HEADI2(28)

```

_DRB0:[MACIE.TM]LISTHEAD.FOR;11

```

3      FORMAT(X,' RUN IDENTIFICATION NUMBER: ',6X,I2)
C
      PRINT 4, HEADB(3)
4      FORMAT(X,'                      PASS NUMBER: ',7X,I1)
C
      PRINT 5, HEADB(8),HEADB(9),HEADB(10)
5      FORMAT(X,'                      START TIME CODE: ',I2,':',I2,':',I2)
C
      PRINT 6, HEADB(5),HEADB(6),HEADB(7)
6      FORMAT(X,'                      DATE: ',I2,'/',I2,'/'I2)
C
      NCHAN=HEADB(4)
C
      PRINT 7
7      FORMAT(X/X,' POSITION : CHANNEL      POSITION : CHANNEL',
1      X/X,' -----'-----'-----')
      NHALF=NCHAN/2
      DO I=1,NHALF
        K=I+NHALF
        PRINT 8, I,HEADB(I+30),K,HEADB(K+30)
8      FORMAT(X,4X,I2,3X,' : ',3X,I2,2X,5X,3X,I2,3X,' : ',3X,I2)
      END DO
C
      RETURN
      END

```

TM No. 861214

APPENDIX D

LISTINGS OF
A2D.FOR
GETHEAD.FOR
LISTHEAD.FOR

D-1/D-2
Reverse Blank

_DRB0:[MACIE.TM]A2D.FOR;2

C A2D.FOR ANALOG TO DIGITAL DIGITIZING PROGRAM

THIS PROGRAM IS CALLED VIA THE A2D COMMAND ROUTINE.
 EACH TAPE TO BE DIGITIZED WILL REQUIRE TWO PASSES AT 1/4 SPEED.
 THE FIRST PASS WILL DIGITIZE 14 DATA CHANNELS 1-12, AND 14-15
 THE SECOND PASS WILL DIGITIZE 14 DATA CHANNELS, 16-25 AND
 REPEAT CHANNELS 2, 4, 10 AND 14. THE REPEATS WILL BE USED FOR
 TAPE ALIGNMENT. MAKE SURE THE HARDWARE IS SET UP ACCORDINGLY.

C TO DIGITIZE:

- 1) LOG ON TO VAX
- 2) SET UP THE DIGITIZING HARDWARE
- 3) MOUNT A TAPE WITH A WRITE RING ON MFA0:
- 4) EXECUTE THE A2D.COM COMMAND FILE, THIS WILL:
 - A. INITIALIZE THE TAPE
 - B. SET THE OUTPUT DIRECTORY/DISK
 - C. ASK FOR HEADER INFORMATION
 - D. ASSIGN AND MOUNT THE TAPE
 - E. SETUP THE HIGH SPEED TAPE DRIVE
 - F. ASSIGN THE NECESSARY PRIVILEGES
 - G. UP THE PROCESS PRIORITY TO 28
 - H. EXECUTE THE DIGITIZING PROGRAM, ****"A2D"****
 - I. LOWER THE PROCESS PRIORITY BACK TO 4
 - J. COPY THE RECAT DATA TO DISK
 - K. COPY THE QUICK CHECK PLOT DATA TO DISK
 - L. DISMOUNT THE TAPE
- 5) CHECK THE QUICK CHECK PLOTS
- 6) REPEAT 2-5

PARAMETER NADC=14 !NUMBER OF A/D CHANNELS USED
 PARAMETER NBSIZE=500 !NUMBER OF WORDS IN ONE BUFFER/CHANNEL
 PARAMETER NRECSIZE=NADC*NBSIZE*2

BYTE HEADB(NRECSIZE)
 INTEGER*2 HEADI2(NRECSIZE/2)
 INTEGER*2 BUFFER(NADC,NBSIZE,3),IOSB(4),IOSBMT(4)
 INTEGER*4 HEADI4(NRECSIZE/4)
 INTEGER*4 IBUF(50),DWELL,SYSSADJWSL,SYSSLCKPAG,INADR(2),IRETADR(2)
 1,SYSSQIOW,IOSB4(2),WRINORET,WEOFNORET,RUNNO
 DIMENSION HEADFP(NRECSIZE/4)
 EQUIVALENCE (HEADB,HEADI2,HEADI4,HEADFP)
 CHARACTER*1 IGO

COMMON /COMM1/ IBUF !COMMONS FOR LONGWORD ALLIGNMENT
 COMMON /COMM2/ BUFFER

EQUIVALENCE (IOSB,IBUF),(IOSBMT,IOSB4)

-----SET UP I/O CODES FOR NO RETRY DUE TO REAL-TIME PROCESSING

EXTERNAL IOS_WRITEBLK,IOS_REWIND,IOS_WRITEOF
 EXTERNAL IOS_SKIPFILE,IOSM_INHRETRY
 WRINORET=%LOC(IOS_WRITEBLK)+%LOC(IOSM_INHRETRY) ! '8020'X
 WEOFNORET=%LOC(IOS_WRITEOF)+%LOC(IOSM_INHRETRY) ! '8028'X

-----GET PROGRAM SAMPLING SPECIFICATIONS

_DRB0:[MACIE.TM]A2D.FOR;2

C

```
PRINT *, 'HOW MANY BUFFERS DO YOU WANT TO FILL?'
READ *, NBUF
```

C

```
NBUF=450           ! NUMBER OF BUFFERS TO FILL
ICHN=0             ! START WITH CHANNEL 0
NCHN=NADC          ! NUMBER OF CHANNELS
LBUF=NADC*NBSIZE   ! SIZE OF EACH BUFFER IN WORDS (I*2)
LBUF2=LBUF*2       ! SIZE OF EACH BUFFER IN BYTES
IPRSET=-1          ! DOES NOT MATTER, NOT USED (-1 TO -32768)
MODE=512           ! SAMPLING OPTION - EXTERNAL SCHMIDT TRIGGER
IRATE=-1           ! CLOCK RATE DIRECT COUPLED SCHMIDT TRIGGER 1
DWELL=1            ! CLOCK OVERFLOWS BETWEEN SAMPLES
IEFN=0             ! DEFAULT TO EVENT FLAG 22
LDELAY=0           ! IGNORED IN DEDICATED MODE
ITYPE=2            ! DEDICATED A/D MODE
NUM=0              ! FOR LOGICAL NAME LPA11$0
INC=1              ! CHANNEL INCREMENT
```

C

C-----GET THE HEADER INFORMATION FOR THIS TAPE

C

```
PRINT *, 'ENTER RUN IDENTIFICATION NUMBER'
READ *, RUNNO
PRINT *, 'ENTER PASS NUMBER (1 OR 2)'
READ *, IPASS
CALL GETHEAD(RUNNO,IPASS,LBUF2,HEADB)
CALL LISTHEAD(HEADB,HEAD12,HEAD14)
```

C

C-----ASSIGN THE TAPE TO LOGICAL NAME MAG_TAPE AND REWIND

C

```
CALL SYSS$ASSIGN('MAG_TAPE',ICHAN,,)
IRETCODE=SYSS$QIOW(,%VAL(ICHAN),IOS$_REWIND,IOSBMT,,,,,,,,)
IF(IOSBMT(1).EQ.'1A4'X) STOP 'TAPE DRIVE IS OFFLINE'
IF(.NOT.IRETCODE) THEN
    WRITE(6,150) 7,(IOSBMT(1),I=1,4)
    STOP 'MAG_TAPE REWIND ERROR'
ENDIF
```

C

C-----SKIP FILES IF REQUESTED

C

1

```
PRINT *, 'HOW MANY FILES DO YOU WANT TO SKIP?'
READ *, NSKIP
IF(NSKIP.LT.0) THEN
    PRINT *, 'YOU MUST ONLY GO IN THE FORWARD DIRECTION'
    PRINT *, 'THE NUMBER OF FILES MUST BE POSITIVE'
    GOTO 1
ENDIF
IRETCODE=SYSS$QIOW(,%VAL(ICHAN),IOS$_SKIPFILE,IOSB,,,,%VAL(NSKIP),,,,,)
IF (.NOT.IRETCODE) STOP 'SKIP FILE ERROR'
IF(IOSB(2).NE.NSKIP) THEN
    PRINT *, 'PROBLEM SKIPPING ',NSKIP, ' FILES'
    PRINT *, IOSB
    STOP 'SKIPPING FILE ERROR'
ENDIF
```

C

C-----DUMP THE HEADER TO TAPE

C

```
NREC=1           !RECORD 1 IS HEADER
```

C

_DRB0:[MACIE.TM]A2D.FOR;2

```

      IRETCODE=SYSSQIOW(%VAL(ICHAN),%VAL(WRINORET),IOSBMT
      1,,,HEADB,%VAL(LBUF2),,,, )
C      WRITE(6,150) 7,(IOSBMT(1),I=1,4)
      IF(IOSBMT(1).EQ.'1A4'X) STOP 'TAPE DRIVE IS OFFLINE'
      IF(.NOT.IRETCODE) STOP 'ERROR MAGTAPE DUMPING HEADER'
C
C-----ADJUST WORKING SET SIZE AND LOCK BUFFER AREA PAGES INTO MEMORY
C
      IRETCODE=SYSSADJWSL(%VAL(200),ILIMIT)      !ADJUST PAGE COUNT
      IF(IRETCODE.NE.1) THEN
        WRITE(6,123) IRETCODE,ILIMIT
123      FORMAT(' RETCODE,NEW LIMIT:',218)
        STOP 'ERROR ADJUSTING WORKING SET SIZE'
      ENDIF
C
      INADR(1)=%LOC(BUFFER(1,1,1))                !START ADDRESS
      INADR(2)=%LOC(BUFFER(NADC,NBSIZE,3))         !STOP ADDRESS
      IRETCODE=SYSSLCKPAG(INADR,IRETADR,)          !LOCK PAGES INTO MEMORY
      IF(IRETCODE.NE.1) THEN
        WRITE(6,124) INADR,IRETADR,IRETCODE,INADR(2)-INADR(1)+2
124      FORMAT(' INADR,IRETADR,IRETCODE FOR BUFFER',/,4012,Z6,I6)
        STOP 'ERROR LOCKING PAGES INTO MEMORY'
      ENDIF
C
C-----LOAD MICROCODE FOR MULTIREQUEST MODE
C
      CALL LPA$LOADMC(ITYPE,NUM,IND,IERROR)
      IF(IND.EQ.1) GO TO 20
C
      LIKELY ERROR IS THAT LOADER IS NOT RUNNING.  TO RUN LOADER
      @[SYSMGR]LPA11STRT
C
      WRITE(6,10) IND
10      FORMAT(' ERROR LOADING MICROCODE, VAX/VMS ERROR CODE=',Z12,' (HEX)')
      STOP
C
C-----DETERMINE SAMPLING RATES AND START THE CLOCK
C
20      CALL LPA$CLOCKA(IRATE,IPRSET,IND,NUM)
      IF(IND.EQ.1) GO TO 40
      WRITE(6,30) IND
30      FORMAT(' ERROR STARTING CLOCK, VAX/VMS ERROR CODE=',Z12,' (HEX)')
      STOP
C
C-----SET IBUF ARRAY FOR SWEEPS, DEFINE THE 3 INPUT BUFFERS
C
40      CALL LPA$SETIBF(IBUF,IND,,BUFFER(1,1,1),BUFFER(1,1,2)
      1,BUFFER(1,1,3))
      IF(IND.EQ.1) GO TO 50
      STOP ' ERROR SETTING UP IBUF ARRAY FOR SWEEPS, LPA$SETIBF'
C
C-----RELEASE ALL THE BUFFERS
C
50      CALL LPA$RLSBUF(IBUF,IND,0,1,2)
      IF(IND.EQ.1) GO TO 60
      STOP ' ERROR RELEASING BUFFER, LPA$RLSBUF'
C
C-----SET CHANNEL INFORMATION FOR SWEEPS, IFLAG RESERVED

```

_DRB0:[MACIE.TM]A2D.FOR;2

```

C
60      CALL LPA$SETADC(IBUF,IFLAG,ICHN,NCHN,INC,IND)
        IF(IND.EQ.1) GO TO 70
        STOP ' ERROR SETTING CHANNEL INFORMATION, LPA$SETADC'

C
C-----GET READY TO DIGITIZE
C
70      WRITE(6,80) HEADB(8),HEADB(9),HEADB(10)
80      FORMAT(' START ANALOG TAPE, HIT RETURN AT ',I2,':',I2,':',I2,$)
        READ 1001, IGO
1001     FORMAT(A1)
C
C-----START THE A/D SWEEPS
C
        CALL LPA$ADSWP(IBUF,LBUF,NBUF,MODE,DWELL,,LDELAY,ICHN,NCHN,IND)
        IF(IND.EQ.1) GO TO 100
        WRITE(6,90) IND
90      FORMAT(' ERROR STARTING SWEEP, VAX/VMS ERROR CODE=',Z12,' (HEX)')
        STOP

C
C-----WAIT FOR NEXT BUFFER TO COMPLETE
C
100     WRITE(6,110) 7 ! TURN ON SAMPLING PULSES AT THE TONE
110     FORMAT(1X,A)
C
120     IBUFNO=LPA$IWTBUF(IBUF,)
        IF(IBUFNO.GE.0) GO TO 140
        WRITE(6,130) 7,7,7,IBUFNO,NREC,IOSB,7,7,7
130     FORMAT(1X,3A1,'ERROR FROM LPA$IWTBUF - IBUFNO=',I5,' REC',I5
1,/, ' ISOB (HEX)',4Z12,3A1)
        STOP 'IBUFNO < 0'

C
C-----DUMP THIS BUFFER TO TAPE
C
140     CONTINUE
        NREC=NREC+1                !INCREMENT RECORD NUMBER
C
        PRINT *, NREC
        IRETCODE=SYS$QIOW(,%VAL(ICHN),%VAL(WRINORET),IOSBMT
1,, ,BUFFER(1,1,1+IBUFNO),%VAL(LBUF2),,,,)
        IF(.NOT.IRETCODE) STOP 'MAG TAPE ERROR'
        IF(IOSBMT(1).NE.1) THEN
            WRITE(6,150) 7,(IOSBMT(I),I=1,4)
150         FORMAT(X,A1,'PROBLEM WRITING TO TAPE , IOSB ',4(Z6))
            WRITE(6,160) NREC,IBUFNO
160         FORMAT(X,'RECORD ',I5,' BUFFER NUMBER ',I2)
        ENDIF
        IF(NREC.GT.NBUF) GO TO 180

C
C-----RELEASE THIS BUFFER FOR A/D TO REFILL, GO GET NEXT ONE
C
        CALL LPA$RLSBUF(IBUF,IND,IBUFNO)
        IF(IND.NE.1) STOP 'LPA$RLSBUF'
        GO TO 120

C
C-----COME HERE AT END OF A CUT AND STOP IN-PROGRESS SWEEP
C
180     CALL LPA$STPSWP(IBUF,1,IND)
        IF(IND.EQ.1) GO TO 200

```


_DRB0:[MACIE.TM]A2D.FOR;2

```
      WRITE(6,190) IND
190    FORMAT(' ERROR STOPPING SWEEP, VAX/VMS ERROR CODE=',Z12,' (HEX)')
C
C----DIGITIZING COMPLETE, PUT TWO END OF FILES ON MAGTAPE
C
200    WRITE(6,210)7,7,7,7
210    FORMAT(' END OF RUN',4A1)
      IRETCODE=SYS$QIOW(,%VAL(ICHAN),IOS_WRITEOF,IOSBMT,,,,,,)
      IRETCODE=SYS$QIOW(,%VAL(ICHAN),IOS_WRITEOF,IOSBMT,,,,,,)
C
      CALL EXIT
      END
```

_DRB0:[MACIE.TM]GETHEAD.FOR;5

```

C      GETHEAD.FOR      GETS OUT THE HEADER INFORMATION FOR A SPECIFIED TAPE.
C-----
C      HEADB(1-2)      HEADI2(1)      ANALOG TAPE NUMBER
C      HEADB(3)      HEADI2(2)      PASS NUMBER (1,2 OR 3)
C      HEADB(4)      "      NUMBER OF CHANNELS 14 OR 24
C      HEADB(5)      HEADI2(3)      DIGITIZING MONTH
C      HEADB(6)      "      DIGITIZING DAY
C      HEADB(7)      HEADI2(4)      DIGITIZING YEAR
C      HEADB(8)      "      EXPERIMENT TIME CODE START HOUR
C      HEADB(9)      HEADI2(5)      EXPERIMENT TIME CODE START MINUTE
C      HEADB(10)      "      EXPERIMENT TIME CODE START SECONDS
C      HEADB(11-30)      HEADI2(6-15)      EVENT NAME (20 CHAR MAXIMUM)
C      HEADB(31)      HEADI2(16)      ANALOG CHANNEL IN POSITION 1
C      HEADB(32)      "      ANALOG CHANNEL IN POSITION 2
C      HEADB(33)      HEADI2(17)      ANALOG CHANNEL IN POSITION 3
C      HEADB(34)      "      ANALOG CHANNEL IN POSITION 4
C      HEADB(35)      HEADI2(18)      ANALOG CHANNEL IN POSITION 5
C      HEADB(36)      "      ANALOG CHANNEL IN POSITION 6
C      HEADB(37)      HEADI2(19)      ANALOG CHANNEL IN POSITION 7
C      HEADB(38)      "      ANALOG CHANNEL IN POSITION 8
C      HEADB(39)      HEADI2(20)      ANALOG CHANNEL IN POSITION 9
C      HEADB(40)      "      ANALOG CHANNEL IN POSITION 10
C      HEADB(41)      HEADI2(21)      ANALOG CHANNEL IN POSITION 11
C      HEADB(42)      "      ANALOG CHANNEL IN POSITION 12
C      HEADB(43)      HEADI2(22)      ANALOG CHANNEL IN POSITION 13
C      HEADB(44)      "      ANALOG CHANNEL IN POSITION 14
C      HEADB(45)      HEADI2(23)      ANALOG CHANNEL IN POSITION 15
C      HEADB(46)      "      ANALOG CHANNEL IN POSITION 16
C      HEADB(47)      HEADI2(24)      ANALOG CHANNEL IN POSITION 17
C      HEADB(48)      "      ANALOG CHANNEL IN POSITION 18
C      HEADB(49)      HEADI2(25)      ANALOG CHANNEL IN POSITION 19
C      HEADB(50)      "      ANALOG CHANNEL IN POSITION 20
C      HEADB(51)      HEADI2(26)      ANALOG CHANNEL IN POSITION 21
C      HEADB(52)      "      ANALOG CHANNEL IN POSITION 22
C      HEADB(53)      HEADI2(27)      ANALOG CHANNEL IN POSITION 23
C      HEADB(54)      "      ANALOG CHANNEL IN POSITION 24
C      HEADB(55)      HEADI2(28)      RUN IDENTIFICATION NUMBER
C      HEADB(56)      "
C      HEADB(57-60)      HEADFP(15)      SAMPLE RATE (2.5 KHZ=.0004SEC)

```

```

C-----
C      SUBROUTINE GETHEAD(RUNNO,IPASS,NBYTES,HEADB)
C-----

```

```

C      BYTE HEADB(1),FILNAM(11)
C      INTEGER RUNNO

```

```

C-----OPEN THE FILE AND READ IN THE HEADER
C

```

```

C      ENCODE(10,4,FILNAM) RUNNO,IPASS
4      FORMAT('R',I2,'P',I1,'H.DAT')
      FILNAM(11)=0
      PRINT 5, (FILNAM(I),I=1,10)
5      FORMAT(X/X,'HEADER FILE: ',10A1//40('-',/))
      OPEN(UNIT=10,NAME=FILNAM,STATUS='OLD',FORM='UNFORMATTED',READONLY)
      READ(10) (HEADB(I),I=1,NBYTES)
      CLOSE(UNIT=10)

```

DRB0:[MACIE.TM]GETHEAD.FOR;5

RETURN
END

_DRB0:[MACIE.TM]LISTHEAD.FOR;11

```

C      LISTHEAD.FOR      LISTS OUT THE HEADER INFORMATION FOR A
C                          SPECIFIED TAPE.
C-----
C      HEADB(1-2)        HEADI2(1)        ANALOG TAPE NUMBER
C      HEADB(3)          HEADI2(2)        PASS NUMBER (1,2 OR 3)
C      HEADB(4)          "                NUMBER OF CHANNELS 14 OR 24
C      HEADB(5)          HEADI2(3)        DIGITIZING MONTH
C      HEADB(6)          "                DIGITIZING DAY
C      HEADB(7)          HEADI2(4)        DIGITIZING YEAR
C      HEADB(8)          "                EXPERIMENT TIME CODE START HOUR
C      HEADB(9)          HEADI2(5)        EXPERIMENT TIME CODE START MINUTE
C      HEADB(10)         "                EXPERIMENT TIME CODE START SECONDS
C      HEADB(11-30)      HEADI2(6-15)     EVENT NAME (20 CHAR MAXIMUM)
C      HEADB(31)         HEADI2(16)      ANALOG CHANNEL IN POSITION 1
C      HEADB(32)         "               ANALOG CHANNEL IN POSITION 2
C      HEADB(33)         HEADI2(17)      ANALOG CHANNEL IN POSITION 3
C      HEADB(34)         "               ANALOG CHANNEL IN POSITION 4
C      HEADB(35)         HEADI2(18)      ANALOG CHANNEL IN POSITION 5
C      HEADB(36)         "               ANALOG CHANNEL IN POSITION 6
C      HEADB(37)         HEADI2(19)      ANALOG CHANNEL IN POSITION 7
C      HEADB(38)         "               ANALOG CHANNEL IN POSITION 8
C      HEADB(39)         HEADI2(20)      ANALOG CHANNEL IN POSITION 9
C      HEADB(40)         "               ANALOG CHANNEL IN POSITION 10
C      HEADB(41)         HEADI2(21)      ANALOG CHANNEL IN POSITION 11
C      HEADB(42)         "               ANALOG CHANNEL IN POSITION 12
C      HEADB(43)         HEADI2(22)      ANALOG CHANNEL IN POSITION 13
C      HEADB(44)         "               ANALOG CHANNEL IN POSITION 14
C      HEADB(45)         HEADI2(23)      ANALOG CHANNEL IN POSITION 15
C      HEADB(46)         "               ANALOG CHANNEL IN POSITION 16
C      HEADB(47)         HEADI2(24)      ANALOG CHANNEL IN POSITION 17
C      HEADB(48)         "               ANALOG CHANNEL IN POSITION 18
C      HEADB(49)         HEADI2(25)      ANALOG CHANNEL IN POSITION 19
C      HEADB(50)         "               ANALOG CHANNEL IN POSITION 20
C      HEADB(51)         HEADI2(26)      ANALOG CHANNEL IN POSITION 21
C      HEADB(52)         "               ANALOG CHANNEL IN POSITION 22
C      HEADB(53)         HEADI2(27)      ANALOG CHANNEL IN POSITION 23
C      HEADB(54)         "               ANALOG CHANNEL IN POSITION 24
C      HEADB(55)         HEADI2(28)      RUN IDENTIFICATION NUMBER
C      HEADB(56)         "               "
C      HEADB(57-60)      HEADFP(15)      SAMPLE RATE (2.5 KHZ=.0004SEC)
C-----

```

SUBROUTINE LISTHEAD(HEADB,HEADI2,HEADI4)

```

C      BYTE HEADB(1)
C      INTEGER*2 HEADI2(1)
C      INTEGER*4 HEADI4(1)

```

-----PRINT OUT THE ALL HEADER INFO

```

C      PRINT 1, (HEADB(I),I=11,30)
1      FORMAT(X,' *** EVENT DESCRIPTION: ',20A1,' ***')
C

```

```

C      PRINT 2, HEADI2(1)
2      FORMAT(X/X,'          ANALOG TAPE NUMBER: ',4X,I4)
C

```

```

C      PRINT 3, HEADI2(28)

```

_DRB0:[MACIE.TM]LISTHEAD.FOR;11

```

3      FORMAT(X,' RUN IDENTIFICATION NUMBER: ',6X,12)
C
      PRINT 4, HEADB(3)
4      FORMAT(X,'                      PASS NUMBER: ',7X,11)
C
      PRINT 5, HEADB(8),HEADB(9),HEADB(10)
5      FORMAT(X,'                      START TIME CODE: ',12,':',12,':',12)
C
      PRINT 6, HEADB(5),HEADB(6),HEADB(7)
6      FORMAT(X,'                      DATE: ',12,'/',12,'/'12)
C
      NCHAN=HEADB(4)
C
      PRINT 7
7      FORMAT(X/X,' POSITION : CHANNEL      POSITION : CHANNEL',
1      X/X,' -----'
      NHALF=NCHAN/2
      DO I=1,NHALF
        K=I+NHALF
        PRINT 8, I,HEADB(I+30),K,HEADB(K+30)
8      FORMAT(X,4X,12,3X,' : ',3X,12,2X,5X,3X,12,3X,' : ',3X,12)
      END DO
C
      RETURN
      END

```

TM No. 861214

APPENDIX E

LISTINGS OF
SAVRECAT.FOR
LISTHEAD.FOR

E-1/E-2
Reverse Blank

_DRB0:[MACIE.TM]SAVRECAT.FOR;3

C SAVRECAT.FOR READS A FOREIGN MAG TAPE MADE BY THE A2D PROGRAM.
 C IT COPIES AND SEPARATES THE REDUNDANT CHANNELS
 C (2,4,10,13) BEGINNING AND ENDING RECORDS TO A
 C DISK FILE. FILENAMES: R_P_C_B.DAT 500 BUFFERS
 C R_P_C_E.DAT 50 BUFFERS
 C -----

C
 C PARAMETER NA2DCH=14 !NUMBER OF CHANNELS
 C PARAMETER NSIZE=500 !NUMBER OF WORDS/CHANNEL IN A RECORD
 C PARAMETER NDIM=NA2DCH*NSIZE*2

C
 C BYTE FILNAM(14),HEADB(NDIM)
 C INTEGER*2 HEADI2(NDIM/2)
 C INTEGER*2 BUF1(NA2DCH,NSIZE),BUF2(NSIZE,NA2DCH),IOSB(4)
 C INTEGER*4 ICHAN,I RETCODE,SYS\$QIOW,RUNNO,PASS
 C INTEGER*4 HEADI4(NDIM/4)
 C DIMENSION IRCH(4)
 C EXTERNAL IOS_READBLK,IOS_REWIND,IOS_SKIPFILE,IOS_SKIPRECORD
 C EQUIVALENCE (HEADB,HEADI2,HEADI4)
 C DATA IRCH/2,4,10,13/ !REDUNDANT CHANNELS

C
 C NCHAN=NA2DCH !NUMBER OF CHANNELS
 C NWORDS=NCHAN*NSIZE !NUMBER OF 1*2 WORDS/BLOCK
 C NBYTES=NWORDS*2 !NUMBER OF BYTES/BLOCK

C
 C-----FIND OUT WHAT RUN WE ARE PROCESSING
 C

C
 C PRINT *, 'ENTER RUN IDENTIFICATION NUMBER'
 C READ *, RUNNO
 C PRINT *, 'ENTER PASS NUMBER'
 C READ *, PASS
 C IGROUP=RUNNO-(RUNNO/10*10)
 C PRINT *, 'PROCESSING GROUP ',IGROUP

C
 C-----ASSIGN THE 9 TRACK TAPE DRIVE (6250) AND MAKE SURE IT IS REWOUND
 C

C
 C CALL SYS\$ASSIGN('MAG TAPE',ICCHAN,,)
 C I RETCODE=SYS\$QIOW(,%VAL(ICCHAN),IOS_REWIND,IOSB,,,,,,)
 C IF (.NOT.I RETCODE) STOP 'REWIND ERROR'

C
 C-----SKIP FILES IF REQUESTED
 C

C
 C 1 PRINT *, 'HOW MANY FILES DO YOU WANT TO SKIP?'
 C READ *, NSKIP
 C IF(NSKIP.LT.0) THEN
 C PRINT *, 'YOU MUST ONLY GO IN THE FORWARD DIRECTION'
 C PRINT *, 'THE NUMBER OF FILES MUST BE POSITIVE'
 C GOTO 1
 C END IF
 C I RETCODE=SYS\$QIOW(,%VAL(ICCHAN),IOS_SKIPFILE,IOSB,,, %VAL(NSKIP),,,,,)
 C IF (.NOT.I RETCODE) STOP 'SKIP FILE ERROR'
 C IF(IOSB(2).NE.NSKIP) THEN
 C PRINT *, 'PROBLEM SKIPPING ',NSKIP, ' FILES'
 C PRINT *, IOSB
 C STOP 'SKIPPING FILE ERROR'
 C END IF

C
 C-----READ IN THE HEADER AND PRINT OUT

_DRB0:[MACIE.TM]SAVRECAT.FOR;3

```

C
      IRETCODE=SYSSQIOW(,%VAL(ICHAN),IOS_READLBLK,IOSB,,,
1      HEADB,%VAL(NBYTES),,,,,)
      IF (.NOT.IRETCODE) STOP 'READING HEADER ERROR'
      IF(IOSB(2).NE.NBYTES) STOP 'WRONG NUMBER OF BYTES READ FOR HEADER'
      CALL LISTHEAD(HEADB,HEAD12,HEAD14)

```

C-----OPEN OUTPUT FILES, CHANNELS WILL SEPERATED INTO R_P_C_B.DAT

```

C
      DO K=1,4
        I=IRCH(K)
        IUNIT=I+10
        ENCODE(13,10,FILNAM) RUNNO,PASS,I
10      FORMAT('R',I2,'P',I1,'C',I2,'B.DAT')
        FILNAM(14)=0
        OPEN(UNIT=IUNIT,STATUS='NEW',FILE=FILNAM,FORM='UNFORMATTED')
        PRINT 20, IUNIT,(FILNAM(J),J=1,13)
20      FORMAT (2X,'OUTPUT UNIT= ',I5,2X,'FILE ',13A1,' 500 BUFFERS')
      END DO

```

C-----READ THE DATA IN

```

C
      NRECORDS=500                                !WE WANT 500 BEGINNING RECORDS
      DO NR=1,NRECORDS

```

```

C
      IRETCODE=SYSSQIOW(,%VAL(ICHAN),IOS_READLBLK,IOSB,,,
1      BUF1,%VAL(NBYTES),,,,,)
      IF (.NOT.IRETCODE) STOP 'ERROR READING DATA RECORD'
      IF(IOSB(1).EQ.'0870'X) THEN
        PRINT *, 'AT EOF IN RECORD ',NR
      ENDIF
      IF(IOSB(2).NE.NBYTES) STOP 'WRONG NUMBER OF BYTES READ FOR DATA'

```

C-----SEPERATE OUT EACH CHANNEL AND SAVE IT ON DISK

```

C
      DO K=1,4                                !SWAP ORDER OF DATA
        I=IRCH(K)
        DO J=1,NSIZE
          BUF2(J,I)=BUF1(I,J)
        END DO
        IUNIT=10+I                                !OUTPUT UNITS 14-26
        WRITE(IUNIT) (BUF2(J,I),J=1,NSIZE)
      END DO
    END DO

```

```

C
      DO K=1,4
        IUNIT=IRCH(K)+10
        CLOSE(UNIT=IUNIT)
      END DO

```

C-----SKIP RECORDS TO END OF TAPE (FOR GROUPS 1-3 ONLY, 4 TOTAL)

```

C
      IF(IGROUP.EQ.4) CALL EXIT
      IF(PASS.EQ.1) THEN
        NSKIP=9250                                !WE RECORDED 9800 FOR PASS 1
      ELSE
        NSKIP=9370                                !WE RECORDED 9920 FOR PASS 2
      ENDIF

```


_DRB0:[MACIE.TM]SAVRECAT.FOR;3

```

        IRETCODE=SYSSQIOW(,%VAL(ICHAN),IOS_SKIPRECORD,IOSB,,,%VAL(NSKIP),,,,,)
        IF (.NOT.IRETCODE) THEN
        600      PRINT 600, (IOSB(I),I=1,4)
                FORMAT(2X,'IOSB ',4Z8.8)
                STOP 'SKIP RECORD ERROR'
        ENDIF
        IF(IOSB(2).NE.NSKIP) THEN
                PRINT *, 'PROBLEM SKIPPING ',NSKIP, ' RECORDS'
                PRINT *, IOSB
                STOP 'SKIPPING RECORD ERROR'
        END IF
C
C-----OPEN OUTPUT FILES, CHANNELS WILL SEPERATED INTO R__P_C__E.DAT
C
        DO K=1,4
            I=IRCH(K)
            IUNIT=I+10
            ENCODE(13,30,FILNAM) RUNNO,PASS,I
        30      FORMAT('R',I2,'P',I1,'C',I2,'E.DAT')
            FILNAM(14)=0
            OPEN(UNIT=IUNIT,STATUS='NEW',FILE=FILNAM,FORM='UNFORMATTED')
            PRINT 40, IUNIT,(FILNAM(J),J=1,13)
        40      FORMAT (2X,'OUTPUT UNIT= ',I5,2X,'FILE ',13A1,' 50 BUFFERS')
        END DO
C
C-----READ THE DATA IN
C
        DO NR=1,51                !WE WANT 50 BUFFERS, MAKE SURE AT EOF
C
            IRETCODE=SYSSQIOW(,%VAL(ICHAN),IOS_READLBLK,IOSB,,,
        1          BUF1,%VAL(NBYTES),,,,,)
            IF (.NOT.IRETCODE) STOP 'ERROR READING DATA RECORD'
            IF(IOSB(1).EQ.'0870'X) THEN
                PRINT *, 'AT EOF IN RECORD ',NR
                GO TO 2
            ENDIF
            IF(IOSB(2).NE.NBYTES) STOP 'WRONG NUMBER OF BYTES READ FOR DATA'
C
C-----SEPERATE OUT EACH CHANNEL AND SAVE IT ON DISK
C
            DO K=1,4                !SWAP ORDER OF DATA
                I=IRCH(K)
                DO J=1,NSIZE
                    BUF2(J,I)=BUF1(I,J)
                END DO
                IUNIT=10+I          !OUTPUT UNITS 14-26
                WRITE(IUNIT) (BUF2(J,I),J=1,NSIZE)
            END DO
        END DO
C
C-----CLOSE THE FILES
C
        2      DO K=1,4
            IUNIT=IRCH(K)+10
            CLOSE(UNIT=IUNIT)
        END DO
        PRINT *, 'RECAT FILES HAVE BEEN SAVED'
        CALL EXIT

```

TM No. 861214

_DRB0:[MACIE.TM]SAVRECAT.FOR;3

END

_DRB0:[MACIE.TM]LISTHEAD.FOR;11

```

C      LISTHEAD.FOR      LISTS OUT THE HEADER INFORMATION FOR A
C                          SPECIFIED TAPE.
C-----
C      HEADB(1-2)        HEADI2(1)        ANALOG TAPE NUMBER
C      HEADB(3)          HEADI2(2)        PASS NUMBER (1,2 OR 3)
C      HEADB(4)          "                NUMBER OF CHANNELS 14 OR 24
C      HEADB(5)          HEADI2(3)        DIGITIZING MONTH
C      HEADB(6)          "                DIGITIZING DAY
C      HEADB(7)          HEADI2(4)        DIGITIZING YEAR
C      HEADB(8)          "                EXPERIMENT TIME CODE START HOUR
C      HEADB(9)          HEADI2(5)        EXPERIMENT TIME CODE START MINUTE
C      HEADB(10)         "                EXPERIMENT TIME CODE START SECONDS
C      HEADB(11-30)      HEADI2(6-15)     EVENT NAME (20 CHAR MAXIMUM)
C      HEADB(31)         HEADI2(16)       ANALOG CHANNEL IN POSITION 1
C      HEADB(32)         "                ANALOG CHANNEL IN POSITION 2
C      HEADB(33)         HEADI2(17)       ANALOG CHANNEL IN POSITION 3
C      HEADB(34)         "                ANALOG CHANNEL IN POSITION 4
C      HEADB(35)         HEADI2(18)       ANALOG CHANNEL IN POSITION 5
C      HEADB(36)         "                ANALOG CHANNEL IN POSITION 6
C      HEADB(37)         HEADI2(19)       ANALOG CHANNEL IN POSITION 7
C      HEADB(38)         "                ANALOG CHANNEL IN POSITION 8
C      HEADB(39)         HEADI2(20)       ANALOG CHANNEL IN POSITION 9
C      HEADB(40)         "                ANALOG CHANNEL IN POSITION 10
C      HEADB(41)         HEADI2(21)       ANALOG CHANNEL IN POSITION 11
C      HEADB(42)         "                ANALOG CHANNEL IN POSITION 12
C      HEADB(43)         HEADI2(22)       ANALOG CHANNEL IN POSITION 13
C      HEADB(44)         "                ANALOG CHANNEL IN POSITION 14
C      HEADB(45)         HEADI2(23)       ANALOG CHANNEL IN POSITION 15
C      HEADB(46)         "                ANALOG CHANNEL IN POSITION 16
C      HEADB(47)         HEADI2(24)       ANALOG CHANNEL IN POSITION 17
C      HEADB(48)         "                ANALOG CHANNEL IN POSITION 18
C      HEADB(49)         HEADI2(25)       ANALOG CHANNEL IN POSITION 19
C      HEADB(50)         "                ANALOG CHANNEL IN POSITION 20
C      HEADB(51)         HEADI2(26)       ANALOG CHANNEL IN POSITION 21
C      HEADB(52)         "                ANALOG CHANNEL IN POSITION 22
C      HEADB(53)         HEADI2(27)       ANALOG CHANNEL IN POSITION 23
C      HEADB(54)         "                ANALOG CHANNEL IN POSITION 24
C      HEADB(55)         HEADI2(28)       RUN IDENTIFICATION NUMBER
C      HEADB(56)         "                "
C      HEADB(57-60)      HEADFP(15)       SAMPLE RATE (2.5 KHZ=.0004SEC)

```

SUBROUTINE LISTHEAD(HEADB,HEADI2,HEADI4)

```

C      BYTE HEADB(1)
C      INTEGER*2 HEADI2(1)
C      INTEGER*4 HEADI4(1)

```

-----PRINT OUT THE ALL HEADER INFO

```

C      PRINT 1, (HEADB(I),I=11,30)
C      FORMAT(X,' *** EVENT DESCRIPTION: ',20A', ' ***')

```

```

C      PRINT 2, HEADI2(1)
C      FORMAT(X/X,'          ANALOG TAPE NUMBER: ',4X,14)

```

```

C      PRINT 3, HEADI2(28)

```

_DRB0:[MACIE.TM]LISTHEAD.FOR;11

```

3      FORMAT(X,' RUN IDENTIFICATION NUMBER: ',6X,12)
C
      PRINT 4, HEADB(3)
4      FORMAT(X,'                      PASS NUMBER: ',7X,11)
C
      PRINT 5, HEADB(8),HEADB(9),HEADB(10)
5      FORMAT(X,'                      START TIME CODE: ',12,':',12,':',12)
C
      PRINT 6, HEADB(5),HEADB(6),HEADB(7)
6      FORMAT(X,'                      DATE: ',12,'/',12,'/'12)
C
      NCHAN=HEADB(4)
C
      PRINT 7
7      FORMAT(X/X,' POSITION : CHANNEL      POSITION : CHANNEL',
1      X/X,' -----
      NHALF=NCHAN/2
      DO I=1,NHALF
        K=I+NHALF
        PRINT 8, I,HEADB(I+30),K,HEADB(K+30)
8      FORMAT(X,4X,12,3X,' : ',3X,12,2X,5X,3X,12,3X,' : ',3X,12)
      END DO
C
      RETURN
      END

```

TM No. 861214

APPENDIX F

LISTINGS OF
READDT.FOR
LISTHEAD.FOR

F-1/F-2
Reverse Blank

_DRB0:[MACIE.TM]READDT.FOR;31

C READDT.FOR READS A FOREIGN MAG TAPE MADE BY THE A2D PROGRAM
C COPIES AND SEPARATES THE DIFFERENT CHANNELS INTO
C DIFFERENT FILES. THIS VERSION IS FOR 14 CHANNELS.
C -----

C
C PARAMETER NA2DCH=14 !NUMBER OF CHANNELS
C PARAMETER NSIZE=500 !NUMBER OF WORDS/CHANNEL IN A RECORD
C PARAMETER NDIM=NA2DCH*NSIZE*2

C
C BYTE FILNAM(13),HEADB(NDIM)
C INTEGER*2 HEADI2(NDIM/2)
C INTEGER*2 BUF1(NA2DCH,NSIZE),BUF2(NSIZE,NA2DCH),IOSB(4)
C INTEGER*4 ICHAN,IRETCODE,SYSSQIOW,RUNNO,PASS
C INTEGER*4 HEADI4(NDIM/4)
C EXTERNAL IOS_READLBLK,IOS_REWIND,IOS_SKIPFILE
C EQUIVALENCE (HEADB,HEADI2,HEADI4)

C
C NCHAN=NA2DCH !NUMBER OF CHANNELS
C NWORDS=NCHAN*NSIZE !NUMBER OF 1*2 WORDS/BLOCK
C NBYTES=NWORDS*2 !NUMBER OF BYTES/BLOCK

C
C-----FIND OUT WHAT RUN WE ARE PROCESSING

C
C PRINT *, 'ENTER RUN IDENTIFICATION NUMBER'
C READ *, RUNNO
C PRINT *, 'ENTER PASS NUMBER'
C READ *, PASS

C
C-----OPEN OUTPUT FILES, CHANNELS WILL SEPERATED INTO R__P_C__.DAT

C
C DO I=1,NCHAN
C IUNIT=I+10
C ICHAN=I
10 ENCODE(12,10,FILNAM) RUNNO,PASS,ICHAN
C FORMAT('R',12,'P',11,'C',12,'.DAT')
C FILNAM(13)=0
C OPEN(UNIT=IUNIT,STATUS='NEW',FILE=FILNAM,FORM='UNFORMATTED')
C PRINT 20, IUNIT,(FILNAM(J),J=1,12)
20 FORMAT (2X,'OUTPUT UNIT= ',15,2X,'FILE '12A1)
C END DO

C
C-----ASSIGN THE 9 TRACK TAPE DRIVE (6250) AND MAKE SURE IT IS REWOUND

C
C CALL SYSS\$ASSIGN('MAG TAPE',ICHAN,,)
C IRETCODE=SYSS\$QIOW(,%VAL(ICHAN),IOS_REWIND,IOSB,,,,,,)
C IF (.NOT.IRETCODE) STOP 'REWIND ERROR'

C
C-----SKIP FILES IF REQUESTED

C
1 PRINT *, 'HOW MANY FILES DO YOU WANT TO SKIP?'
C READ *, NSKIP
C IF(NSKIP.LT.0) THEN
C PRINT *, 'YOU MUST ONLY GO IN THE FORWARD DIRECTION'
C PRINT *, 'THE NUMBER OF FILES MUST BE POSITIVE'
C GOTO 1
C END IF
C IRETCODE=SYSS\$QIOW(,%VAL(ICHAN),IOS_SKIPFILE,IOSB,,, %VAL(NSKIP),,,,,)
C IF (.NOT.IRETCODE) STOP 'SKIP FILE ERROR'

_DRB0:[MACIE.TM]READDT.FOR;31

```

IF (IOSB(2).NE.NSKIP) THEN
  PRINT *, 'PROBLEM SKIPPING ', NSKIP, ' FILES'
  PRINT *, IOSB
  STOP 'SKIPPING FILE ERROR'
END IF

```

C
C-----READ IN THE HEADER AND PRINT OUT
C

```

1 IRETCODE=SYSSQIOW(,%VAL(ICHAN),IOS_READLBLK,IOSB,,,
  HEADB,%VAL(NBYTES),,,,,)
IF (.NOT.IRETCODE) STOP 'READING HEADER ERROR'
IF (IOSB(2).NE.NBYTES) STOP 'WRONG NUMBER OF BYTES READ FOR HEADER'
CALL LISTHEAD(HEADB,HEAD12,HEAD14)

```

C
C-----READ THE DATA IN
C

```

PRINT *, 'HOW MANY RECORDS DO YOU WANT TO READ?'
READ *, NRECORDS

```

C
C DO NR=1,NRECORDS
C

```

1 IRETCODE=SYSSQIOW(,%VAL(ICHAN),IOS_READLBLK,IOSB,,,
  BUF1,%VAL(NBYTES),,,,,)
IF (.NOT.IRETCODE) STOP 'ERROR READING DATA RECORD'
IF (IOSB(1).EQ.'0870'X) THEN
  PRINT *, 'AT EOF IN RECORD ', NR
ENDIF
IF (IOSB(2).NE.NBYTES) STOP 'WRONG NUMBER OF BYTES READ FOR DATA'

```

C
C-----SEPERATE OUT EACH CHANNEL AND SAVE IT ON DISK
C

```

DO I=1,NCHAN !SWAP ORDER OF DATA
  DO J=1,NSIZE
    BUF2(J,I)=BUF1(I,J)
  END DO
END DO
DO I=1,NCHAN
  IUNIT=10+I !OUTPUT UNITS 14-26
  WRITE(IUNIT) (BUF2(J,I),J=1,NSIZE)
END DO
END DO

```

C
C-----CLOSE THE FILE
C

```

DO I=1,NCHAN
  IUNIT=10+I !OUTPUT UNITS 14-26
  CLOSE(IUNIT)
END DO

```

C
CALL EXIT
END

_DRB0:[MACIE.TM]LISTHEAD.FOR;11

```

C      LISTHEAD.FOR      LISTS OUT THE HEADER INFORMATION FOR A
C                          SPECIFIED TAPE.
C-----
C      HEADB(1-2)        HEADI2(1)        ANALOG TAPE NUMBER
C      HEADB(3)          HEADI2(2)        PASS NUMBER (1,2 OR 3)
C      HEADB(4)          "                NUMBER OF CHANNELS 14 OR 24
C      HEADB(5)          HEADI2(3)        DIGITIZING MONTH
C      HEADB(6)          "                DIGITIZING DAY
C      HEADB(7)          HEADI2(4)        DIGITIZING YEAR
C      HEADB(8)          "                EXPERIMENT TIME CODE START HOUR
C      HEADB(9)          HEADI2(5)        EXPERIMENT TIME CODE START MINUTE
C      HEADB(10)         "                EXPERIMENT TIME CODE START SECONDS
C      HEADB(11-30)      HEADI2(6-15)     EVENT NAME (20 CHAR MAXIMUM)
C      HEADB(31)         HEADI2(16)       ANALOG CHANNEL IN POSITION 1
C      HEADB(32)         "                ANALOG CHANNEL IN POSITION 2
C      HEADB(33)         HEADI2(17)       ANALOG CHANNEL IN POSITION 3
C      HEADB(34)         "                ANALOG CHANNEL IN POSITION 4
C      HEADB(35)         HEADI2(18)       ANALOG CHANNEL IN POSITION 5
C      HEADB(36)         "                ANALOG CHANNEL IN POSITION 6
C      HEADB(37)         HEADI2(19)       ANALOG CHANNEL IN POSITION 7
C      HEADB(38)         "                ANALOG CHANNEL IN POSITION 8
C      HEADB(39)         HEADI2(20)       ANALOG CHANNEL IN POSITION 9
C      HEADB(40)         "                ANALOG CHANNEL IN POSITION 10
C      HEADB(41)         HEADI2(21)       ANALOG CHANNEL IN POSITION 11
C      HEADB(42)         "                ANALOG CHANNEL IN POSITION 12
C      HEADB(43)         HEADI2(22)       ANALOG CHANNEL IN POSITION 13
C      HEADB(44)         "                ANALOG CHANNEL IN POSITION 14
C      HEADB(45)         HEADI2(23)       ANALOG CHANNEL IN POSITION 15
C      HEADB(46)         "                ANALOG CHANNEL IN POSITION 16
C      HEADB(47)         HEADI2(24)       ANALOG CHANNEL IN POSITION 17
C      HEADB(48)         "                ANALOG CHANNEL IN POSITION 18
C      HEADB(49)         HEADI2(25)       ANALOG CHANNEL IN POSITION 19
C      HEADB(50)         "                ANALOG CHANNEL IN POSITION 20
C      HEADB(51)         HEADI2(26)       ANALOG CHANNEL IN POSITION 21
C      HEADB(52)         "                ANALOG CHANNEL IN POSITION 22
C      HEADB(53)         HEADI2(27)       ANALOG CHANNEL IN POSITION 23
C      HEADB(54)         "                ANALOG CHANNEL IN POSITION 24
C      HEADB(55)         HEADI2(28)       RUN IDENTIFICATION NUMBER
C      HEADB(56)         "
C      HEADB(57-60)      HEADFP(15)       SAMPLE RATE (2.5 KHZ=.0004SEC)
C-----

```

```

C      SUBROUTINE LISTHEAD(HEADB,HEADI2,HEADI4)
C-----

```

```

C      BYTE HEADB(1)
C      INTEGER*2 HEADI2(1)
C      INTEGER*4 HEADI4(1)

```

```

C      PRINT OUT THE ALL HEADER INFO
C-----

```

```

C      PRINT 1, (HEADB(I),I=11,30)
C      FORMAT(X,' *** EVENT DESCRIPTION: ',20A1,' ***')

```

```

C      PRINT 2, HEADI2(1)
C      FORMAT(X/X,'          ANALOG TAPE NUMBER: ',4X,I4)

```

```

C      PRINT 3, HEADI2(28)

```


_DRB0:[MACIE.TM]LISTHEAD.FOR;11

```

3      FORMAT(X,' RUN IDENTIFICATION NUMBER: ',6X,I2)
C
      PRINT 4, HEADB(3)
4      FORMAT(X,'                                PASS NUMBER: ',7X,I1)
C
      PRINT 5, HEADB(8),HEADB(9),HEADB(10)
5      FORMAT(X,'                                START TIME CODE: ',I2,':',I2,':',I2)
C
      PRINT 6, HEADB(5),HEADB(6),HEADB(7)
6      FORMAT(X,'                                DATE: ',I2,'/',I2,'/'I2)
C
      NCHAN=HEADB(4)
C
      PRINT 7
7      FORMAT(X/X,' POSITION : CHANNEL          POSITION : CHANNEL',
1      X/X,' -----'-----')
      NHALF=NCHAN/2
      DO I=1,NHALF
        K=I+NHALF
        PRINT 8, I,HEADB(I+30),K,HEADB(K+30)
8      FORMAT(X,4X,I2,3X,' : ',3X,I2,2X,5X,3X,I2,3X,' : ',3X,I2)
      END DO
C
      RETURN
      END

```

TM No. 861214

APPENDIX G

LISTINGS OF
QUPL.COM
QUPL.FOR
PLCHAN.FOR

G-1/G-2
Reverse Blank

_DRB0:[MACIE.TM]QUPL.COM;8

\$! QUPL.COM COMMAND STREAM FOR QUICK PLOT CHECK OF 1ST 4 RECORDS
\$! OF ALL 14 A/D CHANNELS.

\$! -----

\$! SET VERIFY
\$ IF P1 .EQS. "" THEN INQUIRE P1 "RUN NUMBER? "
\$!
\$ IF P2 .EQS. "" THEN INQUIRE P2 "PASS NUMBER? "
\$!
\$ IF P3 .EQS. "" THEN -
\$ INQUIRE P3 "ARE YOU RUNNING ON THE TEKTRONICS? (Y/N)"
\$!

\$ SET DEF DRB1:[A2D.QUPL]
\$ OPEN/WRITE QUPL QUPL.IN
\$ WRITE QUPL P1
\$ WRITE QUPL P2
\$ WRITE QUPL "0.,.2"
\$ WRITE QUPL "0.,.2,.05"

\$!
\$ IF F\$STRING(P3) .EQS. "N" THEN GOTO TEKT
\$ WRITE QUPL 2
\$ WRITE QUPL 2
\$ WRITE QUPL 2
\$ WRITE QUPL 2
\$ GOTO MAKEPLOT

\$!
\$ TEKT:
\$ WRITE QUPL 1
\$ WRITE QUPL 1
\$ WRITE QUPL 1
\$ WRITE QUPL 1
\$!

\$ MAKEPLOT:
\$ CLOSE QUPL
\$ ASSIGN/USER_MODE QUPL.IN FOR\$READ
\$ RUN DRB0:[A2D.DIGIT]QUPL !SEND THE PLOT TO THE DISK
\$ DELETE QUPL.IN;*

\$!
\$ DONE:
\$ WRITE SYS\$OUTPUT "PLOTING COMPLETE"
\$ EXIT

TM No. 861214

_DRB0:[MACIE.TM]QUPL.FOR;11

```
C      QUPL.FOR    PERFORMS A QUICKLOOK PLOT OF DIGITIZED DATA THAT
C                  HAS BEEN COPIED FROM TAPE TO DISK.  IT IS PLOTTED
C                  ONE CHAN/PLOT AND 4 CHANNELS/PAGE.  RIGHT NOW
C                  IT PLOTS THE FIRST 4 RECORDS OF 500 PTS.
C                  ALL CHANNELS ARE PLOTTED. 1-4, 5-8, 9-12, 13+14
C-----
```

```
C
C      PARAMETER NDIM=4096,NSIZE=500
C      BYTE FILNAM(13)
C      INTEGER*2 BUFFER(NSIZE)
C      INTEGER CHANNO,RUNNO,PASSNO,ICHAN(4)
C      REAL X(NDIM),Y(NDIM)
C      COMMON ISTART,ISTOP,TMIN,TMAX,TDEL
C      NCHAN=14
C      NREC=4
```

```
C
C-----FIND OUT WHAT RUN WE ARE PROCESSING
C
```

```
      PRINT *, 'ENTER RUN IDENTIFICATION NUMBER'
      READ *, RUNNO
      PRINT *, 'ENTER PASS NUMBER'
      READ *, PASSNO
      PRINT *, 'RUN ', RUNNO, ', PASS ', PASSNO
```

```
C
C-----GET OPERATORS REQUESTED PLOT BOUNDS
C
```

```
      DELTAT=1./2500./4.                !SAMPLE INTERVAL
      NPTS=FLOAT(NREC)*NSIZE
      TIMMAX=FLOAT(NPTS)*DELTAT
      PRINT *, ' '
      PRINT *, 'DATA RANGE IS 0 THRU',TIMMAX,' (SEC), DELTA=',DELTAT,' (SEC)'
      PRINT *, 'INPUT DESIRED DATA MIN AND MAX IN SECONDS'
      READ *, DMIN,DMAX
      PRINT *, ' '
      PRINT *, 'INPUT PLOT TIME AXIS MIN, MAX AND LABEL INCREMENT IN SECONDS'
      READ *, TMIN,TMAX,TDEL
      PRINT *, ' '
```

```
C
C-----MAKE UP TIME AXIS, GET START AND STOP
C
```

```
      DO 1 IS=1,NPTS                      !TIME AXIS
      X(IS)=FLOAT(IS-1)*DELTAT
      CONTINUE
```

```
1
C      DO 2 I=1,NPTS                      !START SAMPLE
      IF(X(I).GE.TMIN) THEN
        ISTART=I
        GO TO 3
      ENDIF
      CONTINUE
2
3
C      CONTINUE
```

```
      DO 4 I=NPTS,1,-1                  !STOP SAMPLE
      IF(X(I).LE.TMAX) THEN
        ISTOP=I
        GO TO 5
      ENDIF
4
      CONTINUE
```

```
_DRB0:[MACIE.TM]QUPL.FOR;11
```

```
5      CONTINUE
```

```
C
C-----OPEN THE FILES, NAMING CONVENTION R__P_C__.DAT
C
```

```
      IPLOT=1
      DO K=1,NCHAN
        CHANNO=K
        IUNIT=10
        ENCODE(12,10,FILNAM) RUNNO,PASSNO,CHANNO
10      FORMAT('R',I2,'P',I1,'C',I2,'.DAT')
        FILNAM(13)=0
        OPEN(UNIT=IUNIT,STATUS='OLD',FILE=FILNAM,FORM='UNFORMATTED')
```

```
C
C-----READ IN THE DATA
C
```

```
      N=0
      DO NREC=1,4
        READ(IUNIT,END=999) (BUFFER(I),I=1,NSIZE)
        DO I=1,NSIZE
          N=N+1
          A=BUFFER(I)
          Y(N)=A/409.5-5
        END DO
      END DO
      CALL CLOSE(IUNIT)
```

```
C
C-----PLOT THE DATA
C
```

```
      ILAST=0
      IF(K.EQ.14) ILAST=1
      IF(IPLOT.EQ.4) ILAST=1
      CALL PLCHAN(ILAST,IPLOT,RUNNO,PASSNO,CHANNO,N,X,Y)
      IPLOT=IPLOT+1
      IF(IPLOT.EQ.5) IPLOT=1
      END DO
```

```
C
999    CALL EXIT
      END
```

_DRB0:[MACIE.TM]PLCHAN.FOR;14

C PLCHAN.FOR PLOTS ONE CHAN OF DATA (4/PG)

C-----SUBROUTINE PLCHAN(ILAST,IPLLOT,IRUN,IPASS,ICHAN,NPT,X,Y)
C-----

C
COMMON ISTART,ISTOP,TMIN,TMAX,TDEL
REAL X(1),Y(1)
CHARACTER*31 TITLAB
IF(IPLLOT.EQ.4) ILAST=1

C
C-----SET UP X AXIS
C

XMIN=TMIN	!X AXIS MINIMUM
XMAX=TMAX	!X AXIS MAXIMUM
XRANGE=XMAX-XMIN	!X AXIS RANGE
NX=XRANGE/TDEL	!X AXIS # INCREMENTS
XDEL=TDEL	!X AXIS LABEL INCREMENT
XSPACE=8000.	!X AXIS SPACE
XMID=XSPACE/2.	!X AXIS MIDPOINT
XSTART=1500.	!X AXIS START POINT

C
C-----SET UP THE Y AXIS
C

YMIN=-5.	!Y AXIS MINIMUM
YMAX=5.	!Y AXIS MAXIMUM
YRANGE=YMAX-YMIN	!Y AXIS RANGE
NY=2	!Y AXIS # INCREMENTS
YDEL=YRANGE/FLOAT(NY)	!Y AXIS LABEL INCREMENTS
YSPACE=1200.	!Y AXIS SPACE
YMID=YSPACE/2.	!Y AXIS MIDPOINT
YSTART=7600.-(YSPACE+400.)*FLOAT(IPLLOT)	!Y AXIS START POINT

C
C-----INITIALIZE THE PLOTTING
C

```

IF(IPLLOT.EQ.1) THEN
  PRINT *, 'PLOT TO IPF FILE ONLY(1)/TO TERMINAL ONLY(2)/BOTH?(3)'
  READ *, IOPTION
  CALL BFIL(IOPTION)
  CALL BJOB
  CALL BFRM(1)
ENDIF
!INITIALIZES A JOB
!WANT 11X8.5

```

C
C-----SET DATA SPACE AND GRID
C

```

CALL SWRKS(XSTART,YSTART,XSPACE,YSPACE,0.) !SET UP WORK SPACE
CALL DRECG(NX,NY*2,0,0,-100.,-100.) !MAKE RECTANGULAR GRID
CALL SDATP(XMIN,YMIN,XRANGE,YRANGE) !SET UP DATA SPACE

```

C
C-----WRITE TITLE ON PLOT
C

```

IF(IPLLOT.EQ.1) THEN
  CALL SSPC(300.,300.) !SET CHARACTER SIZE
  CALL SJST(0,0) !LT,BOTTOM JUSTIFY
  TITLAB='**EXPERIMENT TITLE**'//CHAR(0)
  CALL LSTRG(TITLAB,950.,1600.) !WRITE TITLE
  TITLAB='RUN - PASS '//CHAR(0)
  CALL LSTRG(TITLAB,1700.,1300.) !WRITE TITLE
  CALL LNUMI(IRUN,2900.,1300.) !WRITE RUN ID NUMBER

```

_DRB0:[MACIE.TM]PLCHAN.FOR;14

```

      CALL LNUMI(IPASS,5900.,1300.)      !WRITE PASS NUMBER
    ENDIF
C
C-----WRITE CHAN NUMBER ON PLOT
C
      CALL SSPC(300.,300.)                !SET CHARACTER SIZE
      CALL SJST(0,0)                       !LT,BOTTOM JUSTIFY
      TITLAB='CHAN'//CHAR(0)
      CALL LSTRG(TITLAB,8100.,650.)        !WRITE CHAN
      CALL SJST(1,1)                       !CENTER JUSTIFY
      CALL LNUMI(ICHAN,8700.,400.)        !WRITE CHAN NUMBER
C
C-----LABEL THE X AXIS
C
      IF(ILAST.EQ.1) THEN
        CALL SSPC(300.,300.)                !SET CHARACTER SIZE
        CALL SJST(1,1)                       !CENTER JUSTIFY
        XSPINC=XSPACE/FLOAT(NX)             !Y SPACE INCREMENT
        XVAL=0.                             !INITIAL X SPACE
        VALUE=XMIN                          !INITIAL X VALUE
        DO 6 I=1,NX+1
          IVALUE=VALUE*1000
          CALL LNUMI(IVALE,XVAL,-350.)      !WANT MILLESEC LABEL
          VALUE=VALUE+XDEL                  !WRITE X LABEL
          XVAL=XVAL+XSPINC                  !GET NEXT X VALUE
        CONTINUE                          !GET NEXT X SPACE
        TITLAB='TIME 1/4 SPEED (MSEC)'//CHAR(0)
        CALL LSTRG(TITLAB,XMID,-750.)      !MAKE X AXIS LABEL
        TITLAB='VOLTAGE (VOLTS)'//CHAR(0)
        CALL SJST(1,1)                       !CENTER JUSTIFY
        CALL SROT(0.,90.)                   !ROTATE 90
        YVAL=(7600.-YSTART)/2.             !FIGURE OUT CENTER
        CALL LSTRG(TITLAB,-1250.,YVAL)     !MAKE Y AXIS LABEL
        CALL SROT(0.,0.)                   !ROTATE BACK
      ENDIF
C
C-----LABEL THE Y AXIS
C
      CALL SSPC(300.,300.)                !SET CHARACTER SIZE
      CALL SJST(2,1)                       !RT, CENTER JUSTIFY
      YSPINC=YSPACE/FLOAT(NY)             !Y SPACE INCREMENT
      YVAL=0.                             !INITIAL Y SPACE
      VALUE=YMIN                          !INITIAL Y VALUE
      DO 7 I=1,NY+1
        ID=VALUE
        CALL LNUMI(ID,-100.,YVAL)          !GET INTEGER LABEL
        VALUE=VALUE+YDEL                  !WRITE Y INTEGER LABEL
        YVAL=YVAL+YSPINC                  !GET NEXT Y VALUE
      CONTINUE                          !GET NEXT Y SPACE
7
C
C-----PLOT THE DATA
C
      CALL SWRKS(XSTART,YSTART,XSPACE,YSPACE,0.) !SET UP WORK SPACE
      CALL SDATP(XMIN,YMIN,XRANGE,YRANGE)      !SET UP DATA SPACE
      N=ISTOP-ISTART+1
      CALL DRECP(N,X(ISTART),Y(ISTART),0,0,0)  !PLOT DATA POINTS
C
C-----CLOSE PLOTTING IF DONE

```

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_DRB0:[MACIE.TM]PLCHAN.FOR;14

C

```
IF(ILAST.EQ.1) THEN  
  CALL EFRM  
  CALL EJOB  
  CALL EFIL  
ENDIF
```

C

```
RETURN  
END
```


TM No. 861214

APPENDIX H

LISTINGS OF
DOWNSAMP.FOR
LISTHEAD.FOR

H-1/H-2
Reverse Blank

_DRB0:[MACIE.TM]DOWNSAMP.FOR;58

```

C      DOWNSAMP.FOR  READS A FOREIGN MAG TAPE MADE BY THE A2D PROGRAM.
C                     IT THEN DOWN SAMPLES AND WRITES ALL CHANNELS TO
C                     A DATA FILE FOR FUTURE MERGING.  ALL LEFT OVER DATA
C                     FOR A GROUP IS SAVED AND LATER APPENDED TO THE
C                     FOLLOWING GROUP.  FOR PASS 2, THE GARBAGE DATA DUE
C                     TO ALIGNMENT IS THROWN AWAY.
C-----
C
C      PARAMETER NA2DCH=14      !NUMBER OF CHANNELS
C      PARAMETER NISIZE=500     !NUMBER OF WORDS/CHANNEL IN AN INPUT RECORD
C      PARAMETER NOSIZE=1024    !NUMBER OF WORDS/CHANNEL IN AN OUTPUT RECORD
C
C      PARAMETER NDIM=NA2DCH*NISIZE*2
C
C      BYTE FILNAM(10),HEADB(NDIM)
C      INTEGER*2 IOSB(4),HEAD12(NDIM/2)
C      INTEGER*2 BUF1(NA2DCH,NISIZE),BUF2(NOSIZE,NA2DCH)
C      INTEGER*4 ICHAN,I RETCODE,SYSSQIOW,RUNNO,PASS,HEAD14(NDIM/4)
C      DIMENSION HEADFP(NDIM/4)
C      EXTERNAL IOS_READLBLK,IOS_REWIND,IOS_SKIPFILE,IOS_SKIPRECORD
C      EQUIVALENCE (HEADB,HEAD12,HEAD14,HEADFP)
C
C      NCHAN=NA2DCH              !NUMBER OF CHANNELS
C      NWORDS=NCHAN*NISIZE       !NUMBER OF 1*2 WORDS/BLOCK
C      NBYTES=NWORDS*2          !NUMBER OF BYTES/BLOCK
C      NOUT=NOSIZE              !SAMPLES IN OUTPUT BUFFER/CHAN
C
C-----FIND OUT WHAT WE ARE PROCESSING
C
C      PRINT *, 'ENTER RUN IDENTIFICATION NUMBER'
C      READ *, RUNNO
C
C      PRINT *, 'ENTER PASS NUMBER'
C      READ *, PASS
C      IGROUP=RUNNO-(RUNNO/10*10)
C
C      PRINT *, 'ENTER DOWN SAMPLE INCREMENT, SAVE EVERY?'
C      READ *, IPICK
C      IF(IPICK.LT.0) GO TO 1
C
C      PRINT *, 'ENTER NUMBER OF RECORDS TO LOOK AT?'
C      READ *, NRECMAX
C      IF(NRECMAX.LT.0) GO TO 2
C      NSAMPMAX=NRECMAX*NISIZE
C      PRINT *, 'ENTER MAXIMUM NUMBER OF SAMPLES?'
C      READ *, NSAMPMAX
C
C      PRINT *, 'ENTER RECAT START SAMPLE NUMBER?'
C      READ *, IRECAT
C      IF(IRECAT.LT.1) GO TO 3
C      ISTARTREC=IRECAT/NISIZE      !START RECORD
C      ISTARTSAMP=IRECAT-ISTARTREC*NISIZE !START SAMPLE
C
C-----CHECK ON PASS AND GROUP, SETUP ACCORDINGLY
C
C      IF(PASS.EQ.1) THEN          !PASS 1
C        IF(IGROUP.EQ.1) THEN
C          N=0                    !OUTPUT BUFFER COUNTER

```

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```

      NSAMPLES=1                                !NUMBER OF SAMPLES
    ELSE
      IOLDRUN=RUNNO-1
      ENCODE(9,10,FILNAM) IOLDRUN,PASS          !GET THE DATA TO APPEND
10    FORMAT('R',12,'P',11,'.EXT')
      FILNAM(10)=0
      OPEN(UNIT=10,STATUS='OLD',FILE=FILNAM,FORM='UNFORMATTED')
      READ(10) NEXTST,NSIZE,LASTIPICK
      READ(10) NLEFT,((BUF2(I,J),I=1,NLEFT),J=1,NA2DCH)
      CLOSE(UNIT=10)
      ISTARTSAMP=ISTARTSAMP+NEXTST-1            !START SAMPLE
      N=NLEFT                                   !OUTPUT BUFFER COUNTER
      NSAMPLES=NLEFT*IPICK+IPICK                !NUMBER OF SAMPLES
      IF(NSIZE.NE.NOSIZE) STOP 'OUTPUT BUFFER MISMATCH'
      IF(LASTIPICK.NE.IPICK) STOP 'DOWNSAMPLE INCREMENT MISMATCH'
    ENDIF
  ENDIF

C
  IF(PASS.EQ.2) THEN                            !PASS 2
C
    IF(IGROUP.EQ.1) THEN
      N=0                                       !OUTPUT BUFFER COUNTER
      NSAMPLES=1                             !NUMBER OF SAMPLES
    ELSE
      IOLDRUN=RUNNO-1
      ENCODE(9,10,FILNAM) IOLDRUN,PASS        !GET THE DATA TO APPEND
      FILNAM(10)=0
      OPEN(UNIT=10,STATUS='OLD',FILE=FILNAM,FORM='UNFORMATTED')
      READ(10) NEXTST,NSIZE,LASTIPICK
      READ(10) NLEFT,((BUF2(I,J),I=1,NLEFT),J=1,NA2DCH)
      CLOSE(UNIT=10)
      ISTARTSAMP=ISTARTSAMP+NEXTST-1          !START SAMPLE
      N=NLEFT                                 !OUTPUT BUFFER COUNTER
      NSAMPLES=NLEFT*IPICK+IPICK              !NUMBER OF SAMPLES
      IF(NSIZE.NE.NOSIZE) STOP 'OUTPUT BUFFER MISMATCH'
      IF(LASTIPICK.NE.IPICK) STOP 'DOWNSAMPLE INCREMENT MISMATCH'
    ENDIF
  ENDIF
  NSAMPMAX=NSAMPMAX+NSAMPLES-1
  PRINT *, 'LEFT OVER SAMPLES ',NSAMPLES
  PRINT *, 'NUMBER OF RECORDS TO PROCESS ',NRECMAX
  PRINT *, 'FINAL MAXIMUM NUMBER OF SAMPLES ',NSAMPMAX
C
C
C-----ASSIGN THE 9 TRACK TAPE DRIVE (6250) AND MAKE SURE IT IS REWOUND
C
  CALL SYSS$ASSIGN('MAG TAPE',ICHAN,,)
  IRETCODE=SYSS$QIOW(,%VAL(ICHAN),IOS$REWIND,IOSB,,,,,,,,)
  IF (.NOT.IRETCODE) STOP 'REWIND ERROR'
C
C-----SKIP FILES IF REQUESTED
C
4    PRINT *, 'HOW MANY FILES DO YOU WANT TO SKIP?'
    READ *, NSKIP
    IF(NSKIP.LT.0) THEN
      PRINT *, 'YOU MUST ONLY GO IN THE FORWARD DIRECTION'
      PRINT *, 'THE NUMBER OF FILES MUST BE POSITIVE'
      GOTO 4

```

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```

      END IF
      IRETCODE=SYSSQIOW(,%VAL(ICHAN),IOS_SKIPFILE,IOSB,,, %VAL(NSKIP),,,,,)
      IF (.NOT.IRETCODE) STOP 'SKIP FILE ERROR'
      IF(IOSB(2).NE.NSKIP) THEN
20      PRINT 20, (IOSB(1),I=1,4)
        FORMAT(2X,'IOSB ',4(Z4.4,X))
        STOP 'SKIPPING FILE ERROR'
      END IF
C
C-----READ IN THE HEADER AND PRINT OUT
C
      IRETCODE=SYSSQIOW(,%VAL(ICHAN),IOS_READBLK,IOSB,,,
1      HEADB,%VAL(NBYTES),,,,,)
      IF (.NOT.IRETCODE) STOP 'READING HEADER ERROR'
      IF(IOSB(2).NE.NBYTES) THEN
        PRINT 20, (IOSB(1),I=1,4)
        STOP 'WRONG NUMBER OF BYTES READ FOR HEADER'
      ENDIF
      CALL LISTHEAD(HEADB,HEAD12,HEAD14)
      HEADFP(15)=HEADFP(15)*FLOAT(IPICK)          !UPDATE SAMPLE INTERVAL
C
C-----SKIP THE APPROPRIATE NUMBER OF RECORDS
C
      NSKIP=ISTARTREC
      IF(NSKIP.GT.0) THEN
        IRETCODE=SYSSQIOW(,%VAL(ICHAN),IOS_SKIPRECORD,IOSB,,,
1        %VAL(NSKIP),,,,,)
        IF (.NOT.IRETCODE) STOP 'SKIP RECORD ERROR'
        IF(IOSB(2).NE.NSKIP) THEN
          PRINT 20, (IOSB(1),I=1,4)
          STOP 'SKIPPING RECORD ERROR'
        END IF
      END IF
      NRECIN=NSKIP                                !NUMBER OF INPUT RECORDS (TOTAL)
      NRECOUT=0                                    !NUMBER OF OUTPUT RECORDS
      ISAVE=ISTARTSAMP                             !NEXT POINT IN BUFFER TO SAVE
      IF(ISAVE.GT.NISIZE) STOP 'STARTING POINT > RECORD SIZE'
C
C-----OPEN THE OUTPUT FILE, R__P_.DAT
C
      ENCODE(9,30,FILNAM) RUNNO,PASS
30      FORMAT('R',I2,'P',I1,'.DAT')
      FILNAM(10)=0
      OPEN(UNIT=11,STATUS='NEW',FILE=FILNAM,FORM='UNFORMATTED')
      PRINT 40, (FILNAM(J),J=1,9)
40      FORMAT (2X,'OUTPUT FILE: ',9A1)
      WRITE(11) (HEADB(I),I=1,NBYTES)
C
C-----READ THE DATA IN A RECORD AT A TIME, LOOK FOR THE EOF
C
5      CONTINUE
      IRETCODE=SYSSQIOW(,%VAL(ICHAN),IOS_READBLK,IOSB,,,
1      BUF1,%VAL(NBYTES),,,,,)
      IF (.NOT.IRETCODE) STOP 'ERROR READING DATA RECORD'
      IF(IOSB(1).EQ.'0870'X) THEN
        PRINT *, 'AT EOF'
        NSAMPLELEFT=IPICK*N+IPICK-ISAVE
        GO TO 7

```

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```

ENDIF
IF(IOSB(2).NE.NBYTES) THEN
  PRINT 20, (IOSB(I),I=1,4)
  PRINT *, 'PROBLEM SKIPPING ',NSKIP, ' RECORDS'
  STOP 'WRONG NUMBER OF BYTES READ FOR DATA'
ENDIF
NRECIN=NRECIN+1

C
C-----EXTRACT THE DATA POINTS I WANT TO SAVE AND DUMP FULL BUFFERS
C
6    CONTINUE
    N=N+1
    DO J=1,NA2DCH
      BUF2(N,J)=BUF1(J,ISAVE)
    END DO
    IF(N.EQ.NOUT) THEN
      WRITE(11) ((BUF2(I,J),I=1,NOUT),J=1,NA2DCH)
      NRECOUT=NRECOUT+1
      N=0
    ENDIF
    ISAVE=ISAVE+IPICK
    NSAMPLES=NSAMPLES+IPICK
    IF(NSAMPLES.GT.NSAMPMAX) THEN
      ISAVE=NSAMPLES-NSAMPMAX
      NSAMPLELEFT=N*IPICK+(IPICK-ISAVE)
      NSAMPLES=NSAMPMAX
      GO TO 7
    ENDIF
    IF(ISAVE.LE.NISIZE) GO TO 6
    ISAVE=ISAVE-NISIZE
    GO TO 5

C
C-----AT EOF FILE, CLOSE FILES
C
7    CONTINUE
    CLOSE(UNIT=10)
    CLOSE(UNIT=11)
    NLEFT=N

C
C-----SAVE THE EXTRA DATA FOR APPENDING TO THE FRONT OF THE NEXT GROUP
C
50   ENCODE(9,50,FILNAM) RUNNO,PASS
    FORMAT('R',I2,'P',I1,'.EXT')
    FILNAM(10)=0
    OPEN(UNIT=10,STATUS='NEW',FILE=FILNAM,FORM='UNFORMATTED')
    WRITE(10) ISAVE,NOUT,IPICK !NEXT START, SIZE, INC
    WRITE(10) NLEFT,((BUF2(I,J),I=1,NLEFT),J=1,NA2DCH)
    CLOSE(UNIT=10)

C
C----PRINT THE BOOK KEEPING INFORMATION
C
    PRINT *, 'READ IN ',NRECIN,' RECORDS (SKIPPED ',NSKIP,')'
    PRINT *, 'WROTE OUT ',NRECOUT,' RECORDS'
    PRINT *, 'BUFFER SIZES ARE: IN= 500, OUT= ',NOUT
    PRINT *, 'NUMBER OF SAMPLES LOOKED AT: ',NSAMPLES
    PRINT 60, (FILNAM(I),I=1,9)
60   FORMAT(2X/2X'EXTRA FILE: ',9A1)
    PRINT *, 'NEXT START OFFSET IS: ',ISAVE

```

_DRB0:[MACIE.TM]DOWNSAMP.FOR;58

```

PRINT *, 'NUMBER OF LEFT OVER POINTS TO BE APPENDED: ', NLEFT
PRINT *, ' '
PRINT *, 'NUMBER OF LEFT OVER SAMPLES: ', NSAMPLEFT
PRINT *, ' '
PRINT *, '***DOWNSAMPLE PROGRAM COMPLETE ***'
CALL EXIT
END

```

_DRB0:[MACIE.TM]LISTHEAD.FOR;11

```

C      LISTHEAD.FOR      LISTS OUT THE HEADER INFORMATION FOR A
C                          SPECIFIED TAPE.
C-----
C      HEADB(1-2)        HEADI2(1)        ANALOG TAPE NUMBER
C      HEADB(3)          HEADI2(2)        PASS NUMBER (1,2 OR 3)
C      HEADB(4)          "                NUMBER OF CHANNELS 14 OR 24
C      HEADB(5)          HEADI2(3)        DIGITIZING MONTH
C      HEADB(6)          "                DIGITIZING DAY
C      HEADB(7)          HEADI2(4)        DIGITIZING YEAR
C      HEADB(8)          "                EXPERIMENT TIME CODE START HOUR
C      HEADB(9)          HEADI2(5)        EXPERIMENT TIME CODE START MINUTE
C      HEADB(10)         "                EXPERIMENT TIME CODE START SECONDS
C      HEADB(11-30)      HEADI2(6-15)     EVENT NAME (20 CHAR MAXIMUM)
C      HEADB(31)         HEADI2(16)       ANALOG CHANNEL IN POSITION 1
C      HEADB(32)         "                ANALOG CHANNEL IN POSITION 2
C      HEADB(33)         HEADI2(17)       ANALOG CHANNEL IN POSITION 3
C      HEADB(34)         "                ANALOG CHANNEL IN POSITION 4
C      HEADB(35)         HEADI2(18)       ANALOG CHANNEL IN POSITION 5
C      HEADB(36)         "                ANALOG CHANNEL IN POSITION 6
C      HEADB(37)         HEADI2(19)       ANALOG CHANNEL IN POSITION 7
C      HEADB(38)         "                ANALOG CHANNEL IN POSITION 8
C      HEADB(39)         HEADI2(20)       ANALOG CHANNEL IN POSITION 9
C      HEADB(40)         "                ANALOG CHANNEL IN POSITION 10
C      HEADB(41)         HEADI2(21)       ANALOG CHANNEL IN POSITION 11
C      HEADB(42)         "                ANALOG CHANNEL IN POSITION 12
C      HEADB(43)         HEADI2(22)       ANALOG CHANNEL IN POSITION 13
C      HEADB(44)         "                ANALOG CHANNEL IN POSITION 14
C      HEADB(45)         HEADI2(23)       ANALOG CHANNEL IN POSITION 15
C      HEADB(46)         "                ANALOG CHANNEL IN POSITION 16
C      HEADB(47)         HEADI2(24)       ANALOG CHANNEL IN POSITION 17
C      HEADB(48)         "                ANALOG CHANNEL IN POSITION 18
C      HEADB(49)         HEADI2(25)       ANALOG CHANNEL IN POSITION 19
C      HEADB(50)         "                ANALOG CHANNEL IN POSITION 20
C      HEADB(51)         HEADI2(26)       ANALOG CHANNEL IN POSITION 21
C      HEADB(52)         "                ANALOG CHANNEL IN POSITION 22
C      HEADB(53)         HEADI2(27)       ANALOG CHANNEL IN POSITION 23
C      HEADB(54)         "                ANALOG CHANNEL IN POSITION 24
C      HEADB(55)         HEADI2(28)       RUN IDENTIFICATION NUMBER
C      HEADB(56)         "                "
C      HEADB(57-60)      HEADFP(15)       SAMPLE RATE (2.5 KHZ=.0004SEC)

```

```

C-----
C      SUBROUTINE LISTHEAD(HEADB,HEADI2,HEADI4)
C-----

```

```

C      BYTE HEADB(1)
C      INTEGER*2 HEADI2(1)
C      INTEGER*4 HEADI4(1)

```

```

C-----PRINT OUT THE ALL HEADER INFO

```

```

C      PRINT 1, (HEADB(I),I=11,30)
C      FORMAT(X,' *** EVENT DESCRIPTION: ',20A1,' ***')

```

```

C      PRINT 2, HEADI2(1)
C      FORMAT(X/X,'          ANALOG TAPE NUMBER: ',4X,I4)

```

```

C      PRINT 3, HEADI2(28)

```

_DRB0:[MACIE.TM]LISTHEAD.FOR;11

```

3      FORMAT(X,' RUN IDENTIFICATION NUMBER: ',6X,12)
C
      PRINT 4, HEADB(3)
4      FORMAT(X,'                      PASS NUMBER: ',7X,11)
C
      PRINT 5, HEADB(8),HEADB(9),HEADB(10)
5      FORMAT(X,'                      START TIME CODE: ',12,':',12,':',12)
C
      PRINT 6, HEADB(5),HEADB(6),HEADB(7)
6      FORMAT(X,'                      DATE: ',12,'/',12,'/',12)
C
      NCHAN=HEADB(4)
C
      PRINT 7
7      FORMAT(X/X,' POSITION : CHANNEL      POSITION : CHANNEL',
1      X/X,' -----'-----'-----')
      NHALF=NCHAN/2
      DO I=1,NHALF
        K=I+NHALF
        PRINT 8, I,HEADB(I+30),K,HEADB(K+30)
8      FORMAT(X,4X,12,3X,' : ',3X,12,2X,5X,3X,12,3X,' : ',3X,12)
      END DO
C
      RETURN
      END

```


APPENDIX I

MERGEMENT.FOR
LISTHEAD.FOR

DRB0:[MACIE.TM]MERGEMT.FOR;36

MERGEMT.FOR MERGES TOGETHER DIGITIZED DATA FROM PASSES 1 AND 2 AND WRITES THESE TO TAPE. REDUNDANT CHANNELS ARE DISCARDED. A FOREIGN MAGTAPE IS PRODUCED WITH ONE IDENTIFICATION HEADER RECORD FOLLOWED BY DATA RECORDS, 1024*24 WORDS LONG. THE DATA ORDER IS 1024 SAMPLES FOR EACH CHANNEL 1-24. THE A/D TAPE CHANNEL FOR EACH POSITION IS FOUND IN THE HEADER, THE ORDER IS 1,2,3,4,5,6,7,8,9,10,11,12,14,15,16,17,18,19,20,21,22,23,24,25 (NO 13).

-
- 1) LOG ON TO VAX
 - 2) MOUNT A TAPE WITH A WRITE RING ON MFA0:
 - 3) EXECUTE THE MERGEMT.COM COMMAND FILE, THIS WILL:
 - A. INITIALIZE THAT TAPE TO 6250 BPI (NAME R__)
 - B. OPEN THE TWO DOWNSAMPLED FILES FOR PASSES 1 AND 2
 - C. READ AND MERGE THE TWO HEADER RECORDS
 - D. WRITE THE NEW HEADER RECORD TO TAPE
 - E. FOR ALL DATA RECORDS: READ AND MERGE ALL DATA RECORDS AND WRITE THEM TO TAPE
 - F. MAKE SURE BOTH FILES AT THE SAME POINT
 - G. CLOSE ALL FILES
 - H. WRITE EOF MARKINGS ON OUTPUT TAPE
 - I. DISMOUNT THE TAPE
-

PARAMETER NADC=24 !NUMBER OF FINAL A/D CHANNELS USED
 PARAMETER NBSIZE=1024 !NUMBER OF WORDS IN ONE BUFFER/CHANNEL
 PARAMETER NDIM=14*500*2,NDIM2=NDIM/2,NDIM4=NDIM/4

BYTE HBP1(NDIM),HBP2(NDIM),HBM(NDIM),FILNAM(10),EVENTDESC(20)
 INTEGER*2 IOSBMT(4)
 INTEGER*2 HI2P1(NDIM2),HI2P2(NDIM2),HI2M(NDIM2)
 INTEGER*2 BUFP1(NBSIZE,14),BUFP2(NBSIZE,14),BUFM(NBSIZE,24)
 INTEGER*4 HI4P1(NDIM4),HI4P2(NDIM4),HI4M(NDIM4)
 INTEGER*4 SYSSQIOW,WRINORET,WEOFNORET,RUNNO
 DIMENSION HFPP1(NDIM4),HFPP2(NDIM4),HFPM(NDIM4)
 EQUIVALENCE (HBP1,HI2P1,HI4P1,HFPP1),(HBP2,HI2P2,HI4P2,HFPP2)
 EQUIVALENCE (HBM,HI2M,HI4M,HFPM)
 EQUIVALENCE (BUFP1,BUFM),(BUFP2,BUFM(1,15))

-----SET UP I/O CODES FOR MAGTAPE

EXTERNAL IOS_WRITELBLK,IOS_REWIND,IOS_WRITEOF,IOS_SKIPFILE
 NPT=NBSIZE

-----GET THE RUN IDENTIFICATION INFORMATION

PRINT *, 'ENTER RUN IDENTIFICATION NUMBER'
 READ *, RUNNO

-----OPEN THE FILES AND GET THE HEADERS

10 ENCODE(9,10,FILNAM),RUNNO
 FORMAT('R',12,'P1.FIL')
 FILNAM(10)=0
 OPEN(UNIT=11,STATUS='OLD',FILE=FILNAM,FORM='UNFORMATTED')
 READ(11) HBP1
 CALL LISTHEAD(HBP1,HI2P1,HI4P1)
 ENCODE(9,20,FILNAM),RUNNO

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```

20      FORMAT('R',I2,'P2.FIL')
        FILNAM(10)=0
        OPEN(UNIT=12,STATUS='OLD',FILE=FILNAM,FORM='UNFORMATTED')
        READ(12) HBP2
        CALL LISTHEAD(HBP2,HI2P2,HI4P2)

C
C-----FORM THE NEW HEADER
C
        IF(HI2P1(28).NE.HI2P2(28)) STOP 'DIFFERENT RUNS'
        IF(HBP1(3).NE.1) STOP 'FIRST FILE IS NOT PASS 1'
        IF(HBP2(3).NE.2) STOP 'SECOND FILE IS NOT PASS 2'
        IF(HBP1(61).NE.1) STOP 'FIRST FILE IS NOT FILTERED'
        IF(HBP2(61).NE.1) STOP 'SECOND FILE IS NOT FILTERED'
        DO I=1,60
            HI2M(I)=HI2P1(I)
        END DO
        IF(HI2P1(1).NE.HI2P2(1)) THEN
            PRINT *, 'TAPE NUMBERS DO NOT MATCH, ENTER TAPE NUMBER:'
            READ *, HI2M(1)
        ENDIF
        HBM(3)=3           !MERGED CASE IS PASS 3
        HBM(4)=24          !ALL 24 CHANNELS
        PRINT *, 'ENTER MERGING DATE:  MONTH,DAY'
        READ *, HBM(5),HBM(6)
        ENCODE(20,30,EVENTDESC) RUNNO
30      FORMAT(2X,'  RUN ',I2)
        DO I=1,20
            HBM(I+10)=EVENTDESC(I)
        END DO
        N=45
        DO I=1,14
            IF(I.EQ.2.OR.I.EQ.4.OR.I.EQ.10.OR.I.EQ.13) GO TO 1
            HBM(N)=HBP2(I+30)
            N=N+1
1          CONTINUE
        END DO
        CALL LISTHEAD(HBM,HI2M,HI4M)

C
C-----ASSIGN THE TAPE TO LOGICAL NAME MAG_TAPE AND REWIND
C
        CALL SYSS$ASSIGN('MAG_TAPE',ICHAN,,)
        IRETCODE=SYSS$QIOW(,%VAL(ICHAN),IOS_REWIND,IOSBMT,,,,,,,,)
        IF(.NOT.IRETCODE) THEN
            IF(IOSBMT(1).EQ.'1A4'X) STOP 'TAPE DRIVE IS OFFLINE'
            PRINT 40, (IOSBMT(I),I=1,4)
40          FORMAT(2X,'IOSB: ',4(X,Z4.4))
            STOP 'MAG_TAPE REWIND ERROR'
        ENDIF

C
C-----SKIP FILES IF REQUESTED
C
2        PRINT *, 'HOW MANY FILES DO YOU WANT TO SKIP?'
        READ *, NSKIP
        IF(NSKIP.LT.0) THEN
            PRINT *, 'YOU MUST ONLY GO IN THE FORWARD DIRECTION'
            PRINT *, 'THE NUMBER OF FILES MUST BE POSITIVE'
            GOTO 2
        END IF
    
```

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```

IRETCODE=SYSSQIOW(,%VAL(ICHAN),IOS_SKIPFILE,IOSBMT,,,%VAL(NSKIP),,,,,)
IF (.NOT.IRETCODE) STOP 'SKIP FILE ERROR'
IF(IOSBMT(2).NE.NSKIP) THEN
  PRINT 40, (IOSBMT(1),I=1,4)
  PRINT *, 'PROBLEM SKIPPING ',NSKIP, ' FILES'
  STOP 'SKIPPING FILE ERROR'
END IF

```

```

C
C-----DUMP THE HEADER TO TAPE
C

```

```

  NBYTES=NDIM
  IRETCODE=SYSSQIOW(,%VAL(ICHAN),IOS_WRITEBLK,IOSBMT,
1      ,HBM,%VAL(NBYTES),,,,,)
  IF(.NOT.IRETCODE) STOP 'ERROR MAGTAPE DUMPING HEADER'
  NREC=1      !RECORD 1 IS HEADER
  PRINT *, 'DUMPED HEADER IN ',NREC

```

```

C
C-----READ IN DATA FOR EACH PASS, SHIFT DOWN PASS 2 NEW CHANNELS
C

```

```

  NBYTES=NPT*24*2      !TOTAL #BYTES PER RECORD
3  READ(11,END=4) ((BUFP1(I,J),I=1,NPT),J=1,14)
  READ(12,END=7) ((BUFP2(I,J),I=1,NPT),J=1,14)
  N=15
  DO J=1,14
    IF(J.NE.2.AND.J.NE.4.AND.J.NE.10.AND.J.NE.13) THEN
      DO I=1,NPT
        BUFM(I,N)=BUFP2(I,J)
      END DO
      N=N+1
    ENDIF
  END DO

```

```

C
C-----DUMP THIS BUFFER TO TAPE
C

```

```

  IRETCODE=SYSSQIOW(,%VAL(ICHAN),IOS_WRITEBLK,IOSBMT,
1      ,BUFM,%VAL(NBYTES),,,,,)
  IF(.NOT.IRETCODE) THEN
    PRINT *, IRETCODE
    STOP 'MAG TAPE WRITE ERROR'
  ENDIF
  IF(IOSBMT(1).NE.1) THEN
    PRINT 40,(IOSBMT(1),I=1,4)
  ENDIF
  NREC=NREC+1      !INCREMENT RECORD NUMBER
  PRINT *, 'DUMPED RECORD ',NREC,NBYTES
  IF(IOSBMT(1).EQ.'0878'X) PRINT *, 'SENSED EOT MARKER AT ',NREC
  GO TO 3

```

```

C
C-----AT EOF CHECK THE OTHER FILE
C

```

```

4  CONTINUE
  PRINT *, 'AT EOF FOR PASS 1 FILE'
  NLEFT=0
5  READ(12,END=6) ((BUFP2(I,J),I=1,NPT),J=1,14)
  NLEFT=NLEFT+1
  GO TO 5
6  CONTINUE
  PRINT *, 'AT EOF FOR PASS 2 FILE'

```

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```

        IF(NLEFT.NE.0) PRINT *, 'READ ',NLEFT,' MORE RECORDS'
        GO TO 11
C
7      CONTINUE
        PRINT *, 'AT EOF FOR PASS 2 FILE'
        NLEFT=1
8      READ(11,END=9) ((BUFP2(I,J),I=1,NPT),J=1,14)
        NLEFT=NLEFT+1
        GO TO 8
9      CONTINUE
        PRINT *, 'AT EOF FOR PASS 1 FILE'
        IF(NLEFT.NE.0) PRINT *, 'READ ',NLEFT,' MORE RECORDS'
C
C-----WRITE TWO EOF MARKERS ON TAPE
C
11     CONTINUE
        IRETCODE=SYSSQIOW(,%VAL(ICHAN),IOS_WRITEOF,IOSBMT,,,,,,)
        IRETCODE=SYSSQIOW(,%VAL(ICHAN),IOS_WRITEOF,IOSBMT,,,,,,)
C
        CALL EXIT
        END

```

```

C      LISTHEAD.FOR      LISTS OUT THE HEADER INFORMATION FOR A
C                          SPECIFIED TAPE.
C-----
C      HEADB(1-2)        HEADI2(1)        ANALOG TAPE NUMBER
C      HEADB(3)          HEADI2(2)        PASS NUMBER (1,2 OR 3)
C      HEADB(4)          "                NUMBER OF CHANNELS 14 OR 24
C      HEADB(5)          HEADI2(3)        DIGITIZING MONTH
C      HEADB(6)          "                DIGITIZING DAY
C      HEADB(7)          HEADI2(4)        DIGITIZING YEAR
C      HEADB(8)          "                EXPERIMENT TIME CODE START HOUR
C      HEADB(9)          HEADI2(5)        EXPERIMENT TIME CODE START MINUTE
C      HEADB(10)         "                EXPERIMENT TIME CODE START SECONDS
C      HEADB(11-30)      HEADI2(6-15)     EVENT NAME (20 CHAR MAXIMUM)
C      HEADB(31)         HEADI2(16)      ANALOG CHANNEL IN POSITION 1
C      HEADB(32)         "               ANALOG CHANNEL IN POSITION 2
C      HEADB(33)         HEADI2(17)      ANALOG CHANNEL IN POSITION 3
C      HEADB(34)         "               ANALOG CHANNEL IN POSITION 4
C      HEADB(35)         HEADI2(18)      ANALOG CHANNEL IN POSITION 5
C      HEADB(36)         "               ANALOG CHANNEL IN POSITION 6
C      HEADB(37)         HEADI2(19)      ANALOG CHANNEL IN POSITION 7
C      HEADB(38)         "               ANALOG CHANNEL IN POSITION 8
C      HEADB(39)         HEADI2(20)      ANALOG CHANNEL IN POSITION 9
C      HEADB(40)         "               ANALOG CHANNEL IN POSITION 10
C      HEADB(41)        HEADI2(21)      ANALOG CHANNEL IN POSITION 11
C      HEADB(42)         "               ANALOG CHANNEL IN POSITION 12
C      HEADB(43)        HEADI2(22)      ANALOG CHANNEL IN POSITION 13
C      HEADB(44)         "               ANALOG CHANNEL IN POSITION 14
C      HEADB(45)        HEADI2(23)      ANALOG CHANNEL IN POSITION 15
C      HEADB(46)         "               ANALOG CHANNEL IN POSITION 16
C      HEADB(47)        HEADI2(24)      ANALOG CHANNEL IN POSITION 17
C      HEADB(48)         "               ANALOG CHANNEL IN POSITION 18
C      HEADB(49)        HEADI2(25)      ANALOG CHANNEL IN POSITION 19
C      HEADB(50)         "               ANALOG CHANNEL IN POSITION 20
C      HEADB(51)        HEADI2(26)      ANALOG CHANNEL IN POSITION 21
C      HEADB(52)         "               ANALOG CHANNEL IN POSITION 22
C      HEADB(53)        HEADI2(27)      ANALOG CHANNEL IN POSITION 23
C      HEADB(54)         "               ANALOG CHANNEL IN POSITION 24
C      HEADB(55)        HEADI2(28)      RUN IDENTIFICATION NUMBER
C      HEADB(56)         "               "
C      HEADB(57-60)     HEADFP(15)      SAMPLE RATE (2.5 KHZ=.0004SEC)

```

```

C-----
C      SUBROUTINE LISTHEAD(HEADB,HEADI2,HEADI4)
C-----

```

```

C      BYTE HEADB(1)
C      INTEGER*2 HEADI2(1)
C      INTEGER*4 HEADI4(1)

```

```

C-----PRINT OUT THE ALL HEADER INFO

```

```

C      PRINT 1, (HEADB(I),I=11,30)
C      FORMAT(X,' *** EVENT DESCRIPTION: ',20A1,' ***')

```

```

C      PRINT 2, HEADI2(1)
C      FORMAT(X/X,'          ANALOG TAPE NUMBER: ',4X,I4)

```

```

C      PRINT 3, HEADI2(28)

```

_DRB0:[MACIE.TM]LISTHEAD.FOR;11

```

3      FORMAT(X,' RUN IDENTIFICATION NUMBER: ',6X,12)
C
      PRINT 4, HEADB(3)
4      FORMAT(X,'                                PASS NUMBER: ',7X,11)
C
      PRINT 5, HEADB(8),HEADB(9),HEADB(10)
5      FORMAT(X,'                                START TIME CODE: ',12,':',12,':',12)
C
      PRINT 6, HEADB(5),HEADB(6),HEADB(7)
6      FORMAT(X,'                                DATE: ',12,'/',12,'/',12)
C
      NCHAN=HEADB(4)
C
      PRINT 7
7      FORMAT(X/X,' POSITION : CHANNEL          POSITION : CHANNEL',
1      X/X,' -----'
      NHALF=NCHAN/2
      DO I=1,NHALF
        K=I+NHALF
        PRINT 8, I,HEADB(I+30),K,HEADB(K+30)
8      FORMAT(X,4X,12,3X,' : ',3X,12,2X,5X,3X,12,3X,' : ',3X,12)
      END DO
C
      RETURN
      END

```

APPENDIX J

READMT.FOR
ASSMT.FOR
RBLOCKMT.FOR
LISTHEAD.FOR

_DRB0:[MACIE.TM]READMT.FOR;23

C READMT.FOR READS A FOREIGN MERGED DIGITIZED MAGNETIC TAPE.
 C THE FIRST RECORD CONTAINS HEADER IDENTIFICATION.
 C THE DATA IS GROUPED IN RECORDS OF 1024 PTS EACH
 C FOR ALL 24 CHANNELS (1-25, NO 13). THE FINAL DATA
 C IS WRITTEN TO DISK IN SEPARATE FILES FOR EACH CHANNEL.
 C-----

C
 C PARAMETER NA2DCH=24 !NUMBER OF CHANNELS
 C PARAMETER NSIZE=1024 !NUMBER OF WORDS/CHANNEL IN A RECORD
 C PARAMETER NDIM=14*500*2

C
 C BYTE FILNAM(13),HEADB(NDIM),BUFFER(32768)
 C INTEGER*2 HEADI2(NDIM/2),I2BUF(NSIZE,24),IOSB(4)
 C INTEGER*4 ICHAN,CHANNO,RUNNO,HEADI4(NDIM/4)
 C DIMENSION IFLG(24),ISAVE(24)
 C EQUIVALENCE (HEADB,HEADI2,HEADI4),(BUFFER,I2BUF)
 C EQUIVALENCE (HEADI4(15),SAMP_INT)

C
 C NCHAN=NA2DCH !NUMBER OF CHANNELS
 C NWORDS=NCHAN*NSIZE !NUMBER OF 1*2 WORDS/BLOCK
 C NBYTES=NWORDS*2 !NUMBER OF BYTES/BLOCK

C
 C-----FIND OUT WHAT WE ARE RETREIVEING
 C

C
 C PRINT *, 'ENTER RUN IDENTIFICATION NUMBER'
 C READ *, RUNNO
 C PRINT *, 'HOW MANY CHANNELS DO YOU WANT TO SAVE? (-1=ALL)'
 C READ *, NSAVE
 C IF(NSAVE.EQ.-1) THEN
 C NSAVE=24
 C N=1
 C DO I=1,24
 C ISAVE(I)=N
 C N=N+1
 C IF(N.EQ.13) N=N+1
 C END DO
 C ELSE
 C PRINT *, 'ENTER ANALOG CHANNEL NUMBERS'
 C READ *, (ISAVE(I),I=1,NSAVE)
 C ENDIF
 C PRINT *, 'HOW MANY RECORDS DO YOU WANT TO READ?'
 C READ *, NRECORDS

C
 C-----ASSIGN THE MAGTAPE
 C

C
 C IFILE=1
 C CALL ASSMT(ICHAN,IFILE)

C
 C-----READ IN THE HEADER AND PRINT OUT
 C

C
 C CALL RBLOCKMT(ICHAN,NPTS,HEADI2,ISTAT)
 C IF(ISTAT.EQ.2) STOP 'AT EOF'
 C IF(ISTAT.EQ.1) STOP 'TAPE READ ERROR'
 C IF(NPTS.NE.NDIM/2) STOP 'WRONG NUMBER OF BYTES READ FOR HEADER'
 C CALL LISTHEAD(HEADB,HEADI2,HEADI4)

C
 C-----OPEN OUTPUT FILES, CHANNELS WILL SEPERATED INTO R__C__.DAT
 C

_DRB0:[MACIE.TM]READMT.FOR;23

```

DO I=1,NCHAN
  CHANNO=HEADB(30+I)
  IUNIT=10+I
  IFLG(I)=0
  DO J=1,NSAVE
    IF(ISAVE(J).EQ.CHANNO) IFLG(I)=1
  END DO
  IF(IFLG(I).EQ.1) THEN
10    ENCODE(12,10,FILNAM) RUNNO,CHANNO
    FORMAT('R',I2,'C',I2,'.DAT')
    FILNAM(13)=0
    OPEN(UNIT=IUNIT,STATUS='NEW',FILE=FILNAM,FORM='UNFORMATTED')
    PRINT 20, IUNIT,(FILNAM(J),J=1,12)
20    FORMAT (2X,'OUTPUT UNIT= ',I5,2X,'FILE '12A1)
    WRITE(IUNIT) RUNNO,CHANNO,NWORDS,NRECORDS,SAMP_INT
  ENDIF
END DO

C
C-----READ THE DATA IN
C
DO NR=1,NRECORDS
  CALL RBLOCKMT(ICHAN,NPTS,BUFFER,ISTAT)
  IF(ISTAT.EQ.2) STOP 'AT EOF'
  IF(ISTAT.EQ.1) STOP 'TAPE READ ERROR'
  IF(NPTS.NE.NWORDS) STOP 'WRONG NUMBER OF I*2 READ IN'
  DO I=1,NCHAN
    IF(IFLG(I).EQ.1) THEN
      IUNIT=10+I
      WRITE(IUNIT) (I2BUF(J,I),J=1,NSIZE) !OUTPUT UNITS 11-35
    ENDIF
  END DO
END DO

C
C-----CLOSE THE FILE
C
DO I=1,NCHAN
  IUNIT=10+I
  CLOSE(IUNIT) !OUTPUT UNITS 11-35
END DO

C
CALL EXIT
END

```

_DRB0:[MACIE.TM]ASSMT.FOR;3

```

C      ASSMT.FOR  ASSIGNS A CHANNEL FOR THE MAGNETIC TAPE DRIVE.
C                  IT MUST BE EXTERNALLY ASSIGNED TO THE LOGICAL
C                  NAME MAG_TAPE.  THE TAPE IS REWOUND AND THE
C                  REQUESTED NUMBER OF FILES IS SKIPPED.
C
C      PARAMETERS:
C                  ICHAN = MAGTAPE INPUT CHANNEL NUMBER
C                  IFILE = MAGTAPE INPUT FILE NUMBER
C-----
C      SUBROUTINE ASSMT(ICCHAN,IFILE)
C-----
C
C      EXTERNAL IOS_REWIND,IOS_SKIPFILE
C      INTEGER*2 IOSB(4),EOF,EOT
C      INTEGER*4 SYSS$ASSIGN,SYSS$QIOW,ICCHAN,IRET
C
C      EOF='0870'X      !END OF FILE
C      EOT='0878'X      !END OF TAPE
C      NORMAL='0001'X    !NORMAL
C
C-----ASSIGN THE 9 TRACK TAPE DRIVE "MAG_TAPE" AND ASSIGN THE CHANNEL
C
C      IRET=SYSS$ASSIGN('MAG_TAPE',ICCHAN,,)
C      IF(.NOT.IRET) STOP 'ASSIGN ERROR'
C
C-----REWIND THE TAPE
C
C      IRET=SYSS$QIOW(,%VAL(ICCHAN),IOS_REWIND,IOSB,,,,,,,,)
C      IF(.NOT.IRET) STOP 'REWIND ERROR'
C      IF(IOSB(1).NE.NORMAL) STOP 'REWIND ERROR'
C      NFILE=1                      !PRESENT FILE NUMBER
C
C-----SKIP THE REQUESTED NUMBER OF FILES
C
C      NSKIP=IFILE-1                      !NUMBER OF FILES TO SKIP
C      IF(NSKIP.NE.0) THEN
C          IF(NSKIP.LT.0) NSKIP=NSKIP-1
C          IRET=SYSS$QIOW(,%VAL(ICCHAN),IOS_SKIPFILE,IOSB,,, %VAL(NSKIP),,,,,)
C          IF(.NOT.IRET) STOP 'SKIPFILE ERROR'
C          IF(IOSB(1).NE.NORMAL.AND.IOSB(1).NE.EOF) STOP 'SKIPFILE ERROR'
C          IF(IOSB(2).NE.ABS(NSKIP)) STOP 'SKIPFILE ERROR'
C          NFILE=NFILE+NSKIP              !NEW FILE NUMBER
C          IF(NSKIP.LT.0) THEN
C              IRET=SYSS$QIOW(,%VAL(ICCHAN),IOS_SKIPFILE,IOSB,,, %VAL(1),,,,,)
C              IF(.NOT.IRET) STOP 'SKIPFILE ERROR'
C              IF(IOSB(1).NE.NORMAL.AND.IOSB(1).NE.EOF) STOP 'SKIPFILE ERROR'
C              IF(IOSB(2).NE.1) STOP 'SKIPFILE ERROR'
C              NFILE=NFILE+1              !NEW FILE NUMBER
C          ENDIF
C      ENDIF
C
C      IFILE=NFILE                      !PRESENT MAGTAPE INPUT FILE NUMBER
C
C      RETURN
C      END

```

_DRB0:[MACIE.TM]RBLOCKMT.FOR;16

C RBLOCKMT.FOR READS A BLOCK OF DATA FROM A MAGNETIC TAPE.

C

C

PARAMETERS:

C

ICHAN = CHANNEL ASSIGNED TO THE MAG TAPE UNIT

C

NWORDS = NUMBER OF I*2 DATA POINTS READ

C

I2BUF = BUFFER TO RECEIVE DATA

C

ISTAT = RETURN STATUS (0=OK, 1=ERROR, 2=EOF)

C-----

SUBROUTINE RBLOCKMT(ICHAN,NWORDS,I2BUF,ISTAT)

C-----

C

EXTERNAL IOS_READLBLK

INTEGER*4 SYSSQIOW,ICHAN,IRET

C

INTEGER*2 I2BUF(1),IOSB(4),NORMAL,EOF,EOT,BUFFER(32768)

C

EOF='0870'X !END OF FILE

EOT='0878'X !END OF TAPE

NORMAL='0001'X !NORMAL

ISTAT=0 !ASSUME OK

C

C-----READ IN ONE BLOCK OF DATA

C

IRET=SYSSQIOW(,%VAL(ICHAN),IOS_READLBLK,IOSB,,,

1 BUFFER,%VAL(65535),,,,)

C

IF(.NOT.IRET) THEN

PRINT *, 'IRETURN CODE = ',IRET

PRINT 100, (IOSB(I),I=1,4)

STOP 'READING DATA ERROR'

ENDIF

C

NWORDS=0

CALL MVBITS(IOSB(2),0,16,NWORDS,0)

NWORDS=NWORDS/2

IF(IOSB(1).NE.NORMAL) THEN

IF(IOSB(1).EQ.EOF) THEN

ISTAT=2

GO TO 200

ENDIF

IF(IOSB(1).EQ.EOT) THEN

PRINT *, 'EOT REACHED'

GO TO 200

ENDIF

C

ISTAT=1

!PROBLEM

PRINT *, 'PROBLEM WITH MAGTAPE'

PRINT 100, (IOSB(I),I=1,4)

100

FORMAT(2X,4(Z4.4,2X))

GO TO 200

ENDIF

C

200

CONTINUE

IF(NWORDS.NE.0) THEN

DO I=1,NWORDS

I2BUF(I)=BUFFER(I)

END DO

ENDIF

_DRB0:[MACIE.TM]RBLOCKMT.FOR;16

RETURN
END

_DRB0:[MACIE.TM]LISTHEAD.FOR;11

```

C      LISTHEAD.FOR      LISTS OUT THE HEADER INFORMATION FOR A
C                          SPECIFIED TAPE.
C-----
C      HEADB(1-2)        HEADI2(1)        ANALOG TAPE NUMBER
C      HEADB(3)          HEADI2(2)        PASS NUMBER (1,2 OR 3)
C      HEADB(4)          "                NUMBER OF CHANNELS 14 OR 24
C      HEADB(5)          HEADI2(3)        DIGITIZING MONTH
C      HEADB(6)          "                DIGITIZING DAY
C      HEADB(7)          HEADI2(4)        DIGITIZING YEAR
C      HEADB(8)          "                EXPERIMENT TIME CODE START HOUR
C      HEADB(9)          HEADI2(5)        EXPERIMENT TIME CODE START MINUTE
C      HEADB(10)         "                EXPERIMENT TIME CODE START SECONDS
C      HEADB(11-30)      HEADI2(6-15)     EVENT NAME (20 CHAR MAXIMUM)
C      HEADB(31)         HEADI2(16)      ANALOG CHANNEL IN POSITION 1
C      HEADB(32)         "                ANALOG CHANNEL IN POSITION 2
C      HEADB(33)         HEADI2(17)      ANALOG CHANNEL IN POSITION 3
C      HEADB(34)         "                ANALOG CHANNEL IN POSITION 4
C      HEADB(35)         HEADI2(18)      ANALOG CHANNEL IN POSITION 5
C      HEADB(36)         "                ANALOG CHANNEL IN POSITION 6
C      HEADB(37)         HEADI2(19)      ANALOG CHANNEL IN POSITION 7
C      HEADB(38)         "                ANALOG CHANNEL IN POSITION 8
C      HEADB(39)         HEADI2(20)      ANALOG CHANNEL IN POSITION 9
C      HEADB(40)         "                ANALOG CHANNEL IN POSITION 10
C      HEADB(41)         HEADI2(21)      ANALOG CHANNEL IN POSITION 11
C      HEADB(42)         "                ANALOG CHANNEL IN POSITION 12
C      HEADB(43)         HEADI2(22)      ANALOG CHANNEL IN POSITION 13
C      HEADB(44)         "                ANALOG CHANNEL IN POSITION 14
C      HEADB(45)         HEADI2(23)      ANALOG CHANNEL IN POSITION 15
C      HEADB(46)         "                ANALOG CHANNEL IN POSITION 16
C      HEADB(47)         HEADI2(24)      ANALOG CHANNEL IN POSITION 17
C      HEADB(48)         "                ANALOG CHANNEL IN POSITION 18
C      HEADB(49)         HEADI2(25)      ANALOG CHANNEL IN POSITION 19
C      HEADB(50)         "                ANALOG CHANNEL IN POSITION 20
C      HEADB(51)         HEADI2(26)      ANALOG CHANNEL IN POSITION 21
C      HEADB(52)         "                ANALOG CHANNEL IN POSITION 22
C      HEADB(53)         HEADI2(27)      ANALOG CHANNEL IN POSITION 23
C      HEADB(54)         "                ANALOG CHANNEL IN POSITION 24
C      HEADB(55)         HEADI2(28)      RUN IDENTIFICATION NUMBER
C      HEADB(56)         "                "
C      HEADB(57-60)      HEADFP(15)      SAMPLE RATE (2.5 KHZ=.0004SEC)

```

SUBROUTINE LISTHEAD(HEADB,HEADI2,HEADI4)

```

C      BYTE HEADB(1)
C      INTEGER*2 HEADI2(1)
C      INTEGER*4 HEADI4(1)

```

-----PRINT OUT THE ALL HEADER INFO

```

C      PRINT 1, (HEADB(I),I=11,30)
1      FORMAT(X,' *** EVENT DESCRIPTION: ',20A1,' ***')
C

```

```

C      PRINT 2, HEADI2(1)
2      FORMAT(X/X,'          ANALOG TAPE NUMBER: ',4X,I4)
C

```

```

C      PRINT 3, HEADI2(28)

```

_DRB0:[MACIE.TM]LISTHEAD.FOR;11

```

3      FORMAT(X,' RUN IDENTIFICATION NUMBER: ',6X,I2)
C
      PRINT 4, HEADB(3)
4      FORMAT(X,'                                PASS NUMBER: ',7X,I1)
C
      PRINT 5, HEADB(8),HEADB(9),HEADB(10)
5      FORMAT(X,'                                START TIME CODE: ',I2,':',I2,':',I2)
C
      PRINT 6, HEADB(5),HEADB(6),HEADB(7)
6      FORMAT(X,'                                DATE: ',I2,'/',I2,'/'I2)
C
      NCHAN=HEADB(4)
C
      PRINT 7
7      FORMAT(X/X,' POSITION : CHANNEL          POSITION : CHANNEL',
1      X/X,' -----'-----')
      NHALF=NCHAN/2
      DO I=1,NHALF
        K=I+NHALF
        PRINT 8, I,HEADB(I+30),K,HEADB(K+30)
8        FORMAT(X,4X,I2,3X,' : ',3X,I2,2X,5X,3X,I2,3X,' : ',3X,I2)
      END DO
C
      RETURN
      END

```

TM No. 861214

APPENDIX K

SAMPLE DIGITIZING SESSION

_DRB0:[MACIE.TM]SAMPLE.RUN;1

APPENDIX K - SAMPLE DIGITIZING SESSION

Username:

Password:

Welcome to VAX/VMS version V4.1 on node V331

Last interactive login on Wednesday, 18-JUN-1986 09:20

Last non-interactive login on Monday, 9-JUN-1986 13:19

\$ ALLOC MFA0:

%DCL-I-ALLOC, _MFA0: allocated

\$ A2D

DO YOU WANT TO INITIALIZE THE TAPE? (Y/N) Y

ENTER TAPE LABEL? (R_P): R61P1

%DCL-I-ALLOC, _MFA0: allocated

IS DATA GOING TO DISK 0 OR 1? 1

HAVE YOU ENTERED THE DIGITIZING SETUP? (Y/N) N

ENTER ANALOG TAPE NUMBER: 5

ENTER RUN IDENTIFICATION NUMBER: 61

ENTER DATA TAPE PASS NUMBER (1 OR 2)? 1

ENTER DIGITIZING DATE: MONTH 6

DAY 19

YEAR 86

ENTER START TIME CODE: HOUR 6

MINUTES 41

SECONDS 30

ENTER 20 CHARACTER EVENT DESCRIPTION: RUN 61 PASS 1

ENTER ANALOG CHANNEL FOR A/D CHANNEL 1 : 1

ENTER ANALOG CHANNEL FOR A/D CHANNEL 2 : 2

ENTER ANALOG CHANNEL FOR A/D CHANNEL 3 : 3

ENTER ANALOG CHANNEL FOR A/D CHANNEL 4 : 4

ENTER ANALOG CHANNEL FOR A/D CHANNEL 5 : 5

ENTER ANALOG CHANNEL FOR A/D CHANNEL 6 : 6

ENTER ANALOG CHANNEL FOR A/D CHANNEL 7 : 7

ENTER ANALOG CHANNEL FOR A/D CHANNEL 8 : 8

ENTER ANALOG CHANNEL FOR A/D CHANNEL 9 : 9

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_DRB0:[MACIE.TM]SAMPLE.RUN;1

ENTER ANALOG CHANNEL FOR A/D CHANNEL 10 : 10
ENTER ANALOG CHANNEL FOR A/D CHANNEL 11 : 11
ENTER ANALOG CHANNEL FOR A/D CHANNEL 12 : 12
ENTER ANALOG CHANNEL FOR A/D CHANNEL 13 : 14
ENTER ANALOG CHANNEL FOR A/D CHANNEL 14 : 15

DATA WILL BE SAVED IN FILE: R61P1H.DAT

*** EVENT DESCRIPTION: RUN 61 PASS 1 ***

ANALOG TAPE NUMBER: 5
RUN IDENTIFICATION NUMBER: 61
PASS NUMBER: 1
START TIME CODE: 6:41:30
DATE: 6/19/86

POSTION	:	CHANNEL	POSTION	:	CHANNEL
1	:	1	8	:	8
2	:	2	9	:	9
3	:	3	10	:	10
4	:	4	11	:	11
5	:	5	12	:	12
6	:	6	13	:	14
7	:	7	14	:	15

DOES THIS DATA LOOK CORRECT? (Y/N) Y
DID YOU ASSIGN AND MOUNT THE MAGTAPE? (Y/N) N
%DCL-I-SUPERSEDE, previous value of MAG_TAPE has been superseded
%MOUNT-I-MOUNTED, R61P1 mounted on MFA0:
HOW MANY BUFFERS DO YOU WANT TO FILL?

9300

ENTER RUN IDENTIFICATION NUMBER

61

ENTER PASS NUMBER (1 OR 2)

1

HEADER FILE: R61P1H.DAT

*** EVENT DESCRIPTION: RUN 61 PASS 1 ***

ANALOG TAPE NUMBER: 5
RUN IDENTIFICATION NUMBER: 61
PASS NUMBER: 1
START TIME CODE: 6:41:30
DATE: 6/19/86

POSTION	:	CHANNEL	POSTION	:	CHANNEL
1	:	1	8	:	8

_DRB0:[MACIE.TM]SAMPLE.RUN;1

2	:	2	:	9
3	:	3	:	10
4	:	4	:	11
5	:	5	:	12
6	:	6	:	13
7	:	7	:	14

HOW MANY FILES DO YOU WANT TO SKIP?

0
START ANALOG TAPE, HIT RETURN AT 6:41:30

END OF RUN

DO YOU WANT TO COPY THE RECAT FILES TO DISK? (Y/N) Y

ENTER RUN IDENTIFICATION NUMBER

61
ENTER PASS NUMBER

1
PROCESSING GROUP 1

HOW MANY FILES DO YOU WANT TO SKIP?

0
*** EVENT DESCRIPTION: RUN 61 PASS 1 ***

ANALOG TAPE NUMBER: 5
RUN IDENTIFICATION NUMBER: 61
PASS NUMBER: 1
START TIME CODE: 6:41:30
DATE: 6/19/86

POSTION	:	CHANNEL	POSTION	:	CHANNEL
1	:	1	8	:	8
2	:	2	9	:	9
3	:	3	10	:	10
4	:	4	11	:	11
5	:	5	12	:	12
6	:	6	13	:	14
7	:	7	14	:	15

OUTPUT UNIT = 12 FILE R61P1C 2B.DAT 500 BUFFERS
OUTPUT UNIT = 14 FILE R61P1C 4B.DAT 500 BUFFERS
OUTPUT UNIT = 20 FILE R61P1C10B.DAT 500 BUFFERS
OUTPUT UNIT = 23 FILE R61P1C13B.DAT 500 BUFFERS
OUTPUT UNIT = 12 FILE R61P1C 2E.DAT 50 BUFFERS
OUTPUT UNIT = 14 FILE R61P1C 4E.DAT 50 BUFFERS
OUTPUT UNIT = 20 FILE R61P1C10E.DAT 50 BUFFERS
OUTPUT UNIT = 23 FILE R61P1C13E.DAT 50 BUFFERS

AT EOF IN RECORD 51

RECAT FILES HAVE BEEN SAVED

DO YOU WANT TO COPY QUICK CHECK FILES TO DISK? (Y/N):

ENTER RUN IDENTIFICATION NUMBER

61
ENTER PASS NUMBER

1
OUTPUT UNIT= 11 FILE R61P1C 1.DAT
OUTPUT UNIT= 12 FILE R61P1C 2.DAT
OUTPUT UNIT= 13 FILE R61P1C 3.DAT
OUTPUT UNIT= 14 FILE R61P1C 4.DAT
OUTPUT UNIT= 15 FILE R61P1C 5.DAT

_DRB0:[MACIE.TM]SAMPLE.RUN;1

OUTPUT UNIT= 16 FILE R61P1C 6.DAT
 OUTPUT UNIT= 17 FILE R61P1C 7.DAT
 OUTPUT UNIT= 18 FILE R61P1C 8.DAT
 OUTPUT UNIT= 19 FILE R61P1C 9.DAT
 OUTPUT UNIT= 20 FILE R61P1C10.DAT
 OUTPUT UNIT= 21 FILE R61P1C11.DAT
 OUTPUT UNIT= 22 FILE R61P1C12.DAT
 OUTPUT UNIT= 23 FILE R61P1C13.DAT
 OUTPUT UNIT= 24 FILE R61P1C14.DAT

HOW MANY FILES DO YOU WANT TO SKIP?

*** EVENT DESCRIPTION: RUN 61 PASS 1

ANALOG TAPE NUMBER: 5
 RUN IDENTIFICATION NUMBER: 61
 PASS NUMBER: 1
 START TIME CODE: 6:41:30
 DATE: 6/19/86

POSTION : CHANNEL	POSTION : CHANNEL
1 : 1	8 : 8
2 : 2	9 : 9
3 : 3	10 : 10
4 : 4	11 : 11
5 : 5	12 : 12
6 : 6	13 : 14
7 : 7	14 : 15

HOW MANY RECORDS DO YOU WANT TO READ?

5
 YOU NEED TO RUN DRB0:QUPL.COM TO MAKE PLOTS
 DO YOU WANT TO DISMOUNT THE TAPE? (Y/N): Y
 DIGITIZING PROCEDURE COMPLETE
 \$LO

NOW GO TO A TEKTRONIX TERMINAL AND PERFORM THE FOLLOWING

Username:
 Password:

Welcome to VAX/VMS version V4.1 on node V331
 Last interactive login on Wednesday, 18-JUN-1986 12:33
 Last non-interactive login on Monday, 9-JUN-1986 13:19

\$ QUPL
 RUN NUMBER? : 61
 PASS NUMBER? : 1
 ARE YOU RUNNING ON THE TEKTRONICS? (Y/N): Y

PLOTTING COMPLETE
 \$ DEL R61P1*.DAT;
 \$ LO

TM No. 861214

APPENDIX L

COMMON ERRORS
POSSIBLE REASONS

1. The
2. The

It is very common to get tape/system errors when digitizing data. The digitizing program will print out error messages in the form:

```
PROBLEM WRITING TO TAPE, IOSB 8C 0 5C0 0
RECORD 5854 BUFFER NUMBER 2
ERROR FROM LPA$IWTFBUF - IBUFNO -1 REC 5856
IOSB (HEX) 334 0 A3C0 EFD8
```

The first "IOSB" code, 8C is the error condition you should be concerned with. Here are a few common errors and actions to be taken. Please refer to the Digital Equipment reference manuals for more detail.

CODE	ERROR CODE	MEANING	ACTION TO BE TAKEN
334	SS\$_DEVREQERR	The program could not perform it's function in a timely manner. When you needed control someone else had it.	Try you run over. If the system is very busy and 334 keeps occuring in a short period of time, QUIT, GO HOME!!! TRY AGAIN LATER.
8C	SS\$_DRVERR	Magtape drive error. This program inhibits all tape correction retries.	Set tape aside and mark with record number. Use a new tape. RERUN. The tape is good for other applications.
1A4	SS\$_MEDOFL	Tape drive is offline	Go press the "ON LINE" button on digital drive in the computer room.
1F4	SS\$_PARITY	Tape parity error.	Set tape aside and mark. Use a new tape. RERUN. Tape may not be good.

Please note when digitizing it is critical that all things run in a smooth timely manner. Because all tape retries are inhibited and because you are usually sharing the system with other users, it is very common to have errors occur. Unfortunately, when digitizing the user cannot not tolerate any problems and a session must be restarted. Please expect this. In order to minimize problems, it is best to run when the system is not busy.

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ANALOG TO DIGITAL CONVERSION AND VERIFICATION PROGRAMS
FOR A VAX 11/780

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Environmental Acoustic Research and Analysis Branch

Surface Ship Sonar Department

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